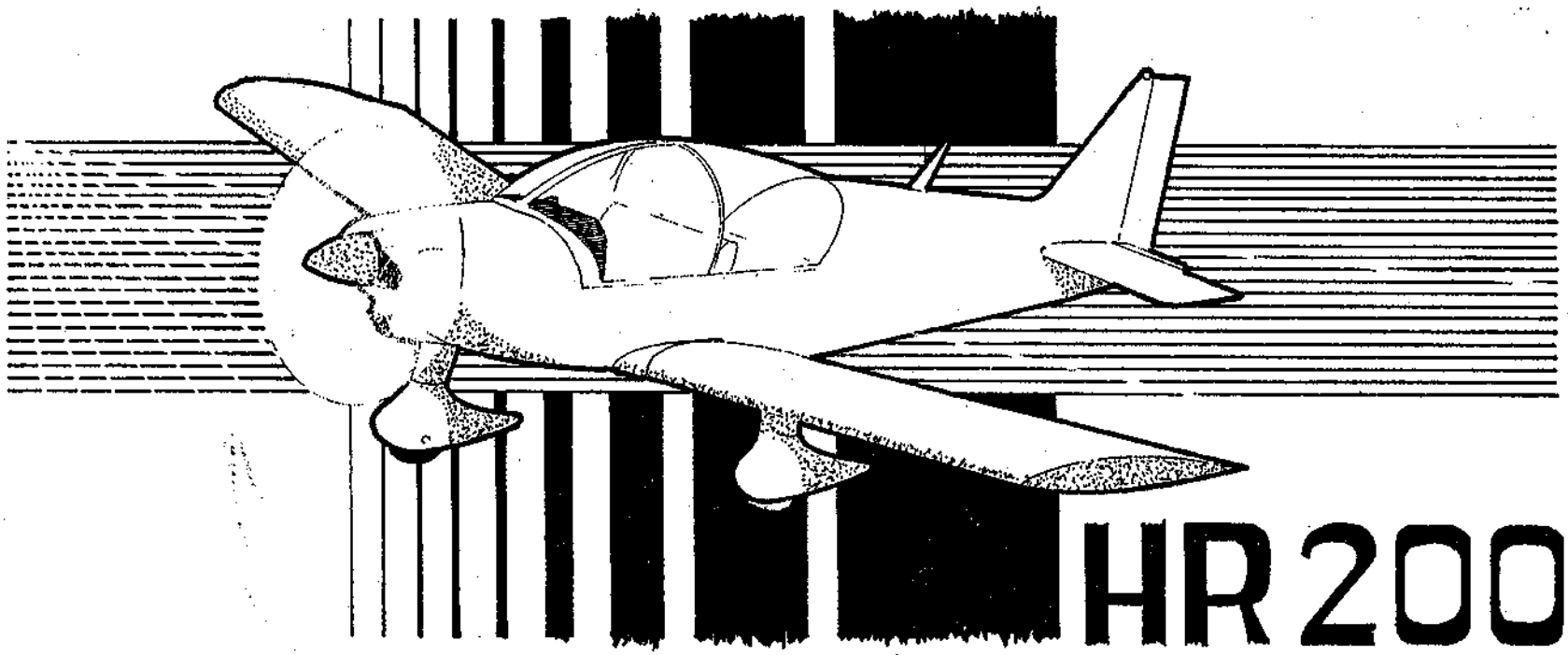
MANUEL D'ENTRETIEN
MAINTENANCE MANUAL
BETRIEBS-HANDBUCH



HR 200

AVIONS PIERRE ROBIN

SERVICE MANUAL
HR 200

Issue 1 - June 1973

CAUTION

This manual is to be used for the HR 200 manufactured before 1985 (up to Serial N° 249)

It does not apply to the aircraft manufactured since June 1993 (Serial N° 250 and following)

TABLE OF CONTENTS

	Pages
SECTION 0 : Presentation	
- Table of contents	0.1 - 0.3
- Amendments - Modifications	0.4
SECTION 1 : Introduction	
- Introduction	1.1
- Technical description	1.2 - 1.3
- Three-view drawing	1.4
SECTION 2 : Preliminary operations before inspection	
- Pre-inspection flight - Repairs and maintenance - Acceptance flight	2.1
- Pre-flight inspection	2.1
- Flight test report (specimen)	2.3 - 2.8
- Acceptance flight	2.9
- Tables : Standard atmosphere and compensation	2.10
- Towing	2.11
- Jacking	2.12
- Levelling	2.12
- Weight and balance	2.15 - 2.17
- Example of weighing/balancing sheet	2.18
- Rigging	2.19
- Recommended lubricants	2.21
SECTION 3 : Fuselage structure	
- Primary and secondary structures	3.1
- Corrosion	3.1 - 3.3

- Structure inspection - Riveting	3.3 - 3.9
- Fuselage inspection - Firewall	3.10
- Front tunnel - Panel console	3.10
- Maintenance/overhaul note : Safety belts	3.10 - 3.19
- Fuselage accessories	3.20 - 3.21

SECTION 4 : Wing structure

- Wing attachments	4.1
- Wing accessories	4.1 - 4.2

SECTION 5 : Flight controls

- Dual stick assembly	5.1
- Ailerons	5.1 - 5.3
- Flaps	5.4
- Tailplane	5.5 - 5.7
- Elevator anti-tab	5.7 - 5.8
- Rudder	5.9 - 5.11
- Polyester fairings - Repairing methods	5.11 - 5.12
- Control surfaces movements	5.13
- Cable adjustment and tensioning	5.14
- Torque loading : hinge pins and structural parts	5.15

SECTION 6 : Landing gears - Braking system

- Checks and adjustments	6.1 - 6.4
- Maintenance : A.P.R. landing gear	6.4 - 6.9
- Maintenance : S.A.B. landing gear	6.9 - 6.10

SECTION 7 : Engine

- Inspection and maintenance - Daily pre-flight checks	7.1
- 25 hour inspection	7.1
- 50 hour inspection	7.1 - 7.2
- 100 hour inspection	7.2 - 7.3
- 400 hour inspection	7.3
- Maintenance procedures	7.3 - 7.6
- Engine accessories	7.6 - 7.10
- Authorized propeller types - Torque loads	7.11

SECTION 8 : Fuel system

- Fuel system diagram 8.1
- Fuel system instruments and accessories 8.2 - 8.4

SECTION 9 : Electrical system

- Description 9.1
- General servicing 9.1 - 9.2
- Battery 9.2 - 9.3
- Accessories 9.3
- Bonding : Engine 9.4
- Bonding : Wing and control surfaces 9.5
- Bonding : Tail unit 9.6

The electrical wiring diagram will be found at the end of this Manual.

SECTION 10 : Venting - Heating

- Description of venting and heating system 10.1
- Accessories 10.1

SECTION 11 : Instruments

- General description 11.1
- Accessories (instrument panel) 11.2 - 11.3
- Instrument panel 11.4 - 11.5

Amendments - Modifications

N°	Pages	Issue	Date	Amendment/modification
1	6.7	2	March 1974	Inflating pressures - Oleo-legs
2	1.3 a 1.4 3.4 3.7 3.6 3.8 3.20 5.2 5.13 5.14 5.15 6.3 7.3 7.8 7.11 11.3 a	3	March 1975	Additions and corrections.
3	1.2-1.3b 1.4-2.13 2.20- 2.19- 3.20- 5.2- 5.13- 6.2-6.1 7.8-7.9 7.10- 7.11- 11.3a-	4	Sept. 1975.	Adding new types : HR 200/100S and HR 200/160.

N°	Pages	Issue	Date	Amendment/modification

SECTION 1

INTRODUCTION

1 - INTRODUCTION

1.1 - This Maintenance Manual has been prepared to help you keep your aircraft fully serviceable and operational.

1.2 - The HR 200 is an aircraft constructed by AVIONS PIERRE ROBIN - 21001 DAROIS.

1.3 - The instructions and information given in this Manual have been divided into 11 Sections.

Each Section describes the various systems installed in this type of aircraft. By using the Table of Contents, at the beginning of this Manual, any selected subject can be easily and readily located.

The various items of equipment described in this document have been manufactured by the AVIONS PIERRE ROBIN Company, except for the following items : engine, propeller, radio equipment and flight instruments.

1.4 - The information given in this document is liable to be modified by the Constructor. The document shall be periodically up-dated as necessary and the Owner of this aircraft shall receive all amendments as and when issued. This document has been designed to permit easy replacement of the modified pages.

1.5 . - Technical description

1.5.1. **Aircraft type** : HR 200/100 and HR 200/100 S.

- **Engine type** : LYCOMING 0.235 - H - 2C (Dynafocal attachment).
  100/108 BHP at 2600 rpm
  F.A.A. Type Certificate n° 223

. Bore	4.375"	(111.125 mm)
. Stroke	3.875"	(98.425 mm)
. Vol. capacity	2.333 cu/in	(3816.441 cm3)
. Comp. ratio	6.5 to 1	
. Firing order	1 - 3 - 2 - 4	
. Mag. timing	25° (both) (Clockwise)	
. Rockers clearance	0.007 to 0.009"	(0.17 to 0.22 mm)

- **Magnetos** : SLICK - LH : ref. n° 4051
  RH : ref. n° 4050

- **Sparking plugs** (fitted on above-mentioned engine) :
  : Champion EM-41-E (see table of approved sparking plugs for Lycoming 0.235 engine)

. Gap setting	0.017 to 0.021"	(0.45 to 0.55 mm)
. Torque loading	30 to 35 lb.ft	(4.15 to 4.85 m/kg)

- **Starter** : PRESTOLITE MZ 4204
- **Alternator** : PRESTOLITE ALY 8403
- **Carburetor** ; MARVEL MA-3 PA
- **Oil filter** : To be cleaned at each oil change.
- **Propeller** : MAC CAULEY 1A-105-BCM-70-56) on HR 200/100 | HOFFMANN H014-178-115 - Ø 70" on HR 200/100S
  . Diameter 70" (1.78 m))
- **Oil cooler** : HARRISON AP.07 AU06-03
- **Battery** : SONNENSCHEIN 532-11
  36 AH - Charged to 32° Baumé
- **Engine electrical equipment** : Oil pressure transmitter : JAEGER 0746 1203 A3
  Voltage regulator : PRESTOLITE VSF 7203
  Vacuum pump : AIRBORNE 200 CC
  Regulating valve : AIRBORNE 133-A.3

- Fuel system : Metal fuel tank - Capacity 26 Imp Gal (120 l)
  Min. octane rating 80/87
- Oil system : C/case capacity 6 quarts (approx. 5.5 l)
  min. 2 quarts (approx. 1.9 l)
  : Oil grade : $< 5°C$ SAE 20 Aviation oil 65
  $\geqslant 5°C$ SAE 40 Aviation oil 80
  $\geqslant 15°C$ SAE 50 Aviation oil 100
- Oil temperature :
  . Min and normal 40°C
  . Max. (red line) 118°C
- Oil pressure :
  . Min. idling 24 psi (1.7 kg/cm2) (Red line)
  . Normal 60 to 89 psi (4.2 to 6.3 kg/cm2) (Green sector)
  . Max. 100 psi (7 kg/cm2) (Starting - warming-up)

1.5.2. - Aircraft type : HR 200/120

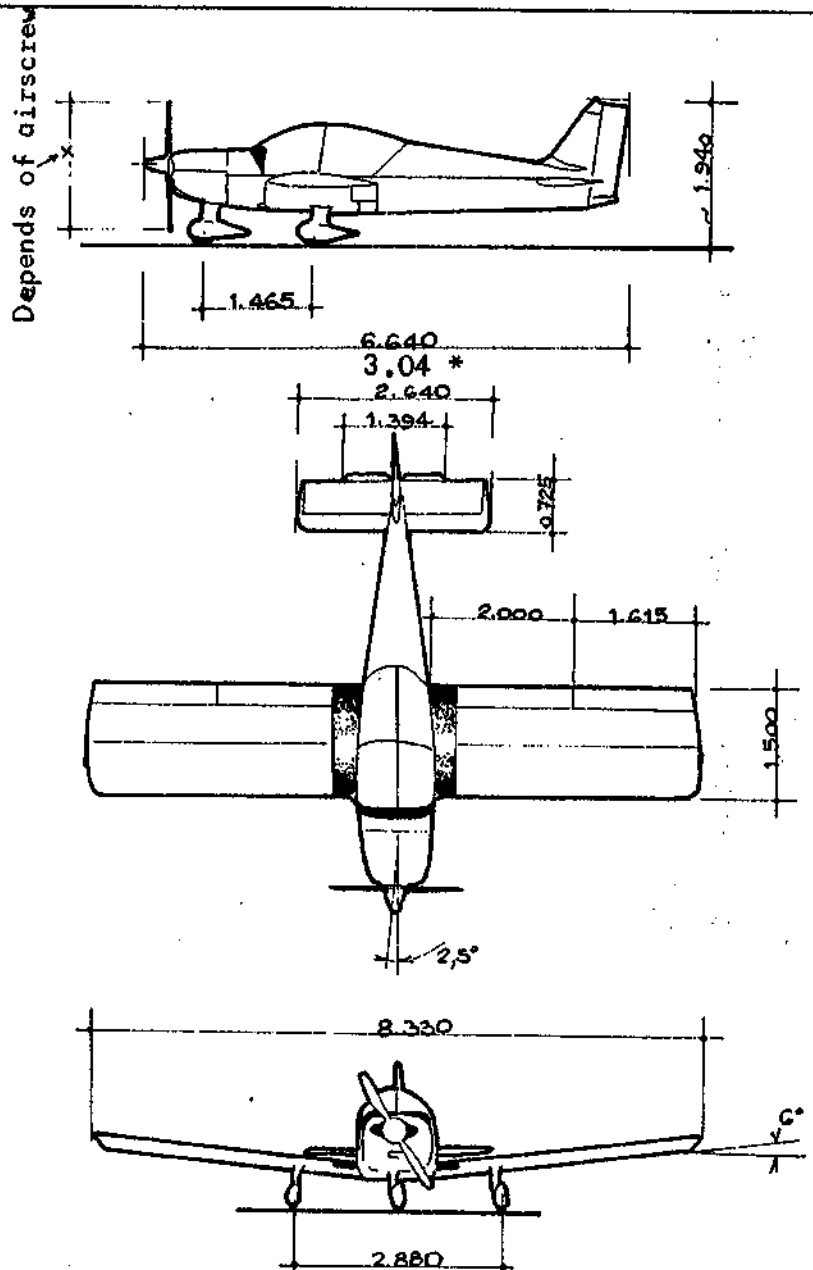
- Engine type : LYCOMING 125 HP at 2800 RPM O-235-J2A
  F.A.A. type certificate n° 223
  . Bore : 4.375 inches . Stroke : 3.875 inches
  . Displacement : 233.3 cu.inches . Compression ratio : 9.7 : 1
  . Firing order : 1 - 3 - 2 - 4 . Spark occurs, BTC : 25°
  . Rocker clearance (cold) : 0.007/0.009 inch.
- Magnetos : LH : Bendix S4LN-21
  RH : Bendix S4LN-20
- Sparking plugs : See last edition of Lycoming Service Instruction n° 1042
- Starter, Alternator, Carburetor, Oil filter : Same as in 1.5.1
- Propeller : MAC CAULEY 1A 135-JCM-71.54
- Oil cooler, Battery, Engine electrical equipment : Same as in 1.5.1
- Fuel system : Same as in 1.5.1, min. octane rating : 100/130.
- Oil system, Oil temperature, Oil pressure : Same as in 1.5.1

1.5.3. Aircraft type HR 200/120 B

- Engine type LYCOMING O-235-L2A - 118 HP at 2800 RPM (dynafocal mount)
  FAA type certificate n° 223
  . Bore : 4.375 inches
  . Displacement : 233.3 cu. inches
  . Stroke : 3.875 inches
  . Compression ratio : 8.5 : 1
  . Firing order : 1 - 3 - 2 - 4
  . Magnetos timing : 20° BTC
  . Rocker clearance (cold) : 0.007/0.009 inch
- Magnetos . Right : Bendix S4 LN - 20
  . Left : Bendix S4 LN - 21
- Spark plugs AC-SR-86 (See latest edition of SI Lycoming nr 1042)
- Airscrews . HOFFMANN HO - 14/178-115
  . MAC-CAULEY 1A135. JCM/71.47
- Other components . See § 1.5.2

1.5.4 - Aircraft type HR 200/160

- Engine : LYCOMING O-320-D - 160 HP at 2700 RPM (dynafocal mount)
  - . FAA type certificate nr 274
  - . Bore : 5.125"
  - . Stroke : 3.875"
  - . Displacement : 319. 8 cu.in.
  - . Compression ratio : 8.5 : 1
  - . Firing order : 1-3-2-4
  - . Magneto timing : 25° BTC
  - . Rocker arm clearance (cold) : 0.007/0.009"
- Magnetos : . Right : Bendix S4LN-1209
  . Left : Bendix S4LN-1227
- Spark plugs : . AC : A88, SR88D
  . Champion : REM 40E (Sel latest edition of S.I. Lycoming nr 1042)
- Starter : Prestolite
- Propeller : SENSENICH 74 DM 6S5 2-66, Ø = 72", pitch : 66" Minimum repair diameter : 72"



On HR 200/120B, HR 200/100S and HR 200/160 tail plane length is always 3.04 meters.

* On HR 200/100 and HR 200/120 : if modification n° 10 applied.

SECTION 2

PRELIMINARY OPERATIONS BEFORE INSPECTION

2.1 - Pre-inspection flight - Repairs and maintenance - Acceptance flight

The rational organization of an overhaul workshop must permit the detection and the elimination, in a systematical manner, of any assembly which does not comply with the Constructor's drawings and airframe design documents.
It will be necessary to take into account all documents issued by the engine and propeller manufacturers, as well as those applicable to all flight and control instruments with a life potential.

For this reason, all overhaul work must be carried out in the best conditions possible.

Thus, the pre-inspection and acceptance flights are carried out to help the Repairer in his task.

Consequently, all overhauls will be carried out in the following manner :

1 - Pre-flight inspection : note impact points on fuselage, wing, control surfaces, fairings, propeller, tyres.

2 - Pre-inspection flight : to detect all anomalies, normal operation of engine, electrical and mechanical controls, correct markings, measurements, temperatures, speeds, ...

3 - Repair and maintenance work : including the fitting of optional equipment, as requested by the Customer.

4 - Acceptance flight (after overhaul) : to permit final adjustments to be made and to comply with Customer and Test Pilot instructions.

The test flight (pre-inspection or acceptance) report given hereafter, as an example, will be used by the pilot. It must be considered only as a basic document and is, in no way, limitative in its content. Each aircraft of the HR 200 type might be fitted with optional equipment, as requested by the Customer. In such case, the test pilot must include such equipment in the list of items to be checked during flight.

2.2 - Pre-flight inspection (applicable for daily pre-flight checks)

- Carried out by the pilot.
- Time required : approximately 15 minutes.

1 - Battery switch ON (up) : check fuel content gauge.
Battery switch OFF (down)
Magneto switches OFF
Fuel cock ON
Controls lock removed.

2 - Check cleanliness of static vents (1 on each side of the fuselage)

3 - Check state of flaps and flap hinges

4 - Check state of tail unit control surfaces and hinges

5 - Check state of ailerons and aileron hinges

6 - Check the fuel tanks filler caps for security. Before the first flight of the day and after each refuelling operation, purge the fuel system (one purge cock under the fuselage, in line with wing trailing edge).

7 - Check the state of the landing gears : fairings and attachments, tyre pressure.
Oleo-leg pressure : ensure that the remaining stroke is comprised between 2.4 and 3.5" (60 and 90 mm).
The top of the wheel spat must be located between the two marks provided on the fixed leg.

8 - Check canopy for cleanliness.

9 - Check the oil level (top up for a long flight. Never fly with less than 2 quarts of oil in the c/case).
Close and lock the access panel. Check state of propeller, spinner, cooling baffles, air filter.
Check the exhaust manifold for security.

2.3 - Flight test Report (Specimen)

Company : xyz * Strike out as applicable	Flight report : pre-inspection * acceptance
Aircraft Serial n° : Registration n° : Propeller : Load : Balance :	Place : Date : Departure parking : hrs. T/O : Return parking : hrs Landing : Duration of flight:
Crew : QFE (tower) : QFE (aircraft): Zp ; Wind : kt Ground T°: Humidity : QFU :	
Max. approved weight : 1720 lb (780 kg)	True weight :
X = OK V = defective	1 - Before starting (inside)

Check	For	Result
. Fuel system	Gauge and indicator operation	
. Rotating beacon	Correct operation	
. Safety belt/harness	Presence. Operation	
. Sliding hood and lock	State, operation, locking	
. Flight controls	Movement - Direction	
. Elevator tab control	Movement - Direction (from outside)	
. Flaps control	Play	
. All other controls	Free movement	
. Warning light test	Operation	
. Flight instruments	Markings present	
. Emergency electrical fuel pump		
. Altimeter error		
. Rate of climb error		
. Alternator excitation OFF		

2 - After starting

Check	For	Result
- Engine warming up (1200 rpm)	Normal operation : Min. and idling : 40°C (green line) Max. : 118°C (red line)	
- Oil pressure	Min. (red line) : 10 psi (0.7 kg/cm2) (yellow arc) : 10 to 30 psi (0.7 to 2.1 kg/cm2) Normal (green arc) : 30 to 60 psi (2.1 to 4.2 kg/cm2) Max. (red line) : 100 psi (7 kg/cm2)	
- Vacuum pressure	Normal : 3.7 to 4.2"	
- Radio equipment	Base or tower frequency	

3 - Taxying

Check	For	Result
- Brakes (taxying) - Brakes (straight run) - Handbrake	LH and RH With both pedals	

4 - Engine ground run

Check	For	Result
- N°1 and N°2 magneto selection (at 1800 rpm)	Max. rev drop : 125 rpm between 1 and 2 and 1 + 2	
- Full throttle	RPM : Boost press :	
- Oil pressure, idling	10 psi min. :	
- Oil temperature, min. idling	40 to 76°C min :	
- Slow running before T/O	600 rpm	

5 - Before take-off

Check	For	Result
- Landing gear	Handbrake	
- Ignition	1 + 2	
- Controls	Freedom of movement	
- Carburetor	Mixture control fully forward	
- Trim tab	In neutral	
- Oil	Pressure - Temperature (green arc)	
- Harness	Locked	
- Fuel	Selector ON - Pressure - W/light - Fuel pump (electrical) ON	
- Electrical system	Fuses in position - All applicable switches ON	
- Flaps	Take-off position	
- Canopy	Closed and latched	
- Outside	Foreign objects - Approach	
- Adjustments	Instruments - Compass indication corresponding with runway axis - Trim tab - Chronometer - Directional gyro.	

6 - Take-off - Full throttle

V (km/h)	Nt/nm	Boost.press.	Oil press.	Oil temp.	Fuel press.	Vacuum

7 - Climbing - Full throttle

Trim	V (km/h)	n/s	Nt/nm	Boost press	Oil press.	Oil temp.	Fuel press	Vacuum

8 - Level flight Zm : Outside temperature :

	Trim	V (km/h)	Nt/nm	Boost press	Oil press	Oil temp.	Fuel press.	Vacuum
Full throttle								
75 % W								
Overspeed :		V. to be obtained : 333 km/h				Obtained :		

9 - Stall (full idling)

The stall warning device is set to give warning 5 to 9 kts before stalling speed is reached.

Configuration	All up	Trim	Full flaps	Trim
V. probe				
V. stall				
Behaviour				

10 - Flaps

Full flaps : V :	km/h	Behaviour :

11 - Trim adjustments in level flight

Roll axis		Yaw axis		Pitch axis	
				Tab mark	

Stability	Banked	L	R	Ball	L	R

12 - Inside checks

X = OK
V = defective

Check	Result	Check	Result
- Carb. heater (rev. drop		- Fuel tank gauge	
- Mixture		- Air vents sealing	
- Heating		- Canopy sealing	
- Demisting		- Vacuum suply to instruments	
- Ventilation		- Artificial horizon	
- Rev. counter		- Directional gyro	
- Boost pressure		- Magnesyn	
- Altimeter, n°1		- Ball indicator	
- Altimeter, n°2		- VHF, n°1	
- Rate of climb indicator		- VHF, n°2	
- Outside temperature		- VOR, n°1	
- Cylinder temperature		- VOR, n°2	
- Carb. temperature		- Glide	
- Ammeter		- Markers	
- Voltmeter		- Radio-compass	
- Oil temperature		- Transponder	
- Oil pressure		- DME	
- Fuel pressure		- Brittain	
- Hour counter			

13 - Descent

Full flaps - V Stabilization :	Tab mark :

12 - Landing

- Flap operation	:
- Flap warning lights operation	:
- Straight run	:
- Braking	:

15 - Engine stopping

- Idling, after flight	:	- Alternator	:
- Radio OFF	:	- Battery OFF	:
- Stable engine speed	:	- Switches OFF	:
- Gyro caging	:	- Handbrake ON (or chocks in position)	:
- Mag cut-off test	:	- Canopy cover in position	:
- Mixture OFF	:	- Towing bar in position	:

16 - Adjustments

- Airframe :	- Instruments :
- Engine :	- Radio equipment :

2.4 - Acceptance flight

The acceptance test flight procedure is identical to that of the pre-inspection test flight.

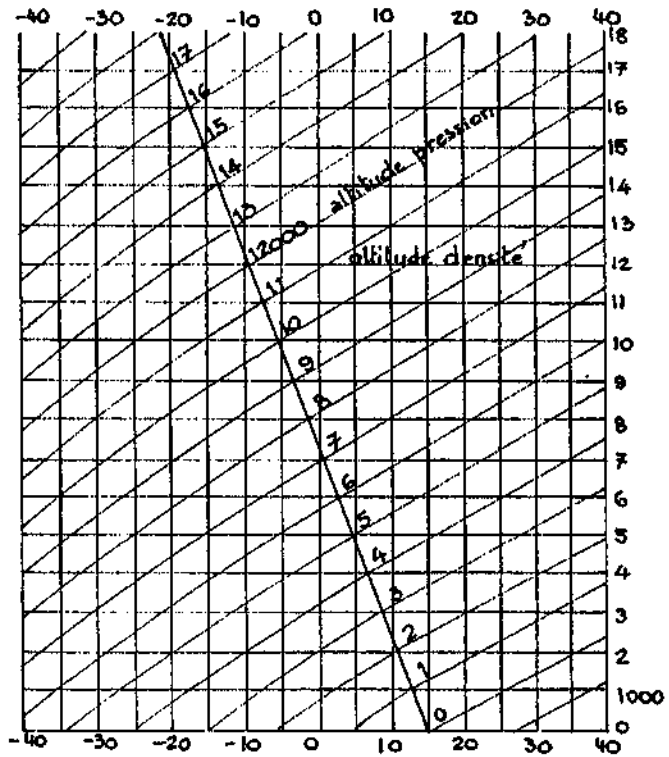
It might however cover, when applicable, a number of instruments additional to those checked during the pre-inspeotion test flight (optional equipment fitted during overhaul).

2.5 - Standard atmosphere

: relative density of the air

Altitude Pieds	TEMPERATURES Centig.	Fahren.	PRESSIONS MM/HG	Millib.	Inch/HG	δ	$\sqrt{\delta}$	Altitude Mètres
17.000	- 18,7	- 1,7	395	527	15,56	0,589	0,768	5182
16.000	- 16,7	1,9	412	549	16,21	0,609	0,781	4877
15.000	- 14,7	5,5	428	571	16,88	0,629	0,794	4572
14.000	- 12,7	9,1	446	595	17,57	0,650	0,807	4267
13.000	- 10,8	12,6	465	620	18,29	0,671	0,820	3962
12.000	- 8,8	16,2	483	644	19,03	0,693	0,833	3658
11.000	- 6,8	19,8	503	671	19,79	0,715	0,846	3353
10.000	- 4,8	23,4	523	697	20,58	0,738	0,859	3048
9.000	- 2,8	27,0	543	724	21,38	0,761	0,873	2743
8.000	- 0,8	30,6	564	752	22,22	0,786	0,887	2438
7.000	1,1	34,0	586	781	23,09	0,811	0,901	2134
6.000	3,1	37,6	609	812	23,98	0,836	0,915	1829
5.000	5,1	41,2	632	843	24,89	0,862	0,929	1624
4.000	7,1	44,8	656	873	25,84	0,888	0,943	1219
3.000	9	48,4	681	908	26,81	0,915	0,957	914
2.000	11	51,8	707	943	27,82	0,943	0,971	610
1.000	13	55,4	733	978	28,86	0,971	0,985	305
0	15	59,0	760	1013	29,92	1.000	1.000	0

Correction of temperature readings



Subtract 4°C from the values read (correction valid during normal cruising and at all altitudes)

2.6 - Towing (possible, with handbrake OFF)

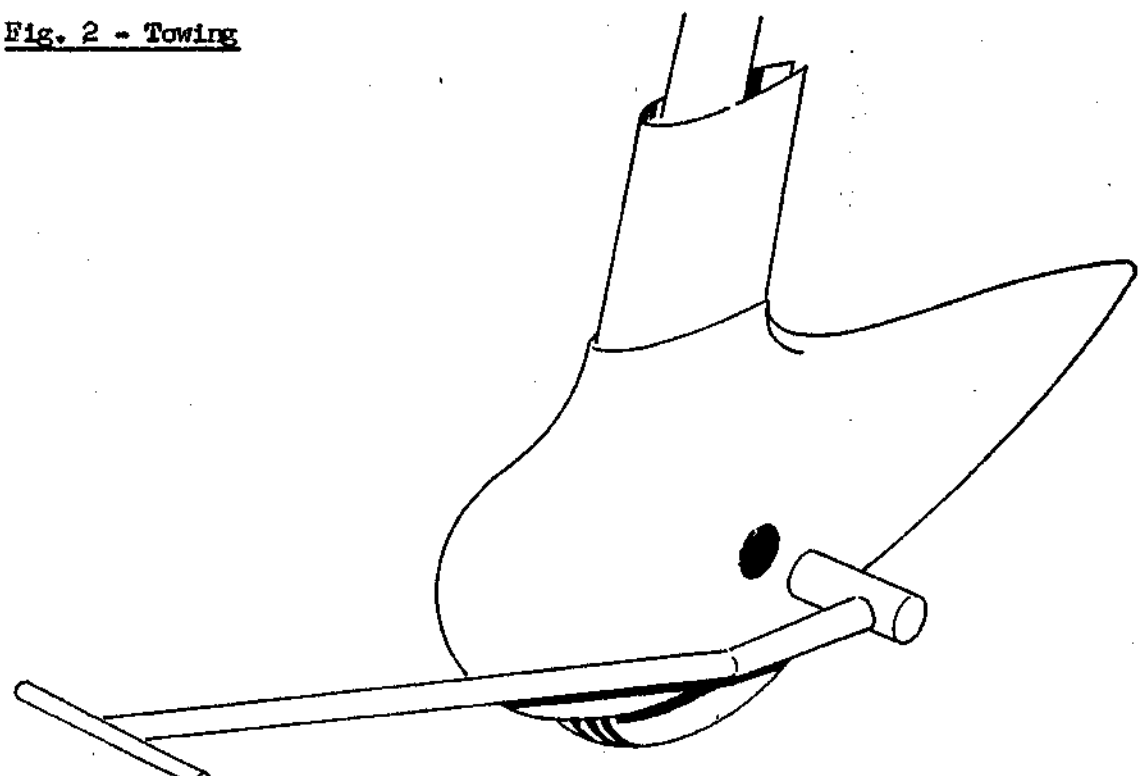
The aircraft can be easily manoeuvred on the ground with the help of a towing bar attached to the nose wheel (see fig. 2). After use, the towing bar must be stowed back in the luggage compartment.

On smooth ground, the aircraft can be easily handled by only one person.

Rearward loading of the aircraft will cause the nose wheel to lock. To free it, lift the tail up to move the nose down and thus release the nose wheel centering locking cam.

In particular, avoid turning the nose wheel more than 30° on either side of the central axis. This precaution will enhance correct mechanical operation and prevent damages. Your aircraft will therefore be less costly to maintain.

Fig. 2 - Towing



2.7 - Jacking

To jack the aircraft, proceed as follows :

The aircraft must be placed inside a properly equipped servicing (or overhaul) workshop, as laid down in the applicable official documentation.

The floor of the zone where the overhaul operations will be carried out must be as flat as possible.

1 - Locate the jacks under the jacking points (wing under-surface), as illustrated on fig. 4.

2 - Place a trestle under the fuselage rear section.

2.8 - Levelling

When the jacks and the trestle are in position, level-up the aircraft longitudinally and transversely, by raising or lowering the jacks. The main wheels and the nose wheel must be off the ground (1/2" between ground and nose wheel tyre to permit free rotation of the nose wheel).

- Longitudinal levelling : place the spirit level on the fuselage spar, next to the arm rests.
- Transversal levelling : place the spirit level on the upper cross member, above the rear bench seat (see fig. 4).

With the aircraft thus levelled, secure a block of material weighing approximately 88 lb to the mooring ring provided on the tail of the aircraft, to prevent accidental tilting down of the nose. This will protect your propeller against annoying and costly damages.

Fig. 3 - Pre-inspection operations

Access doors and panels

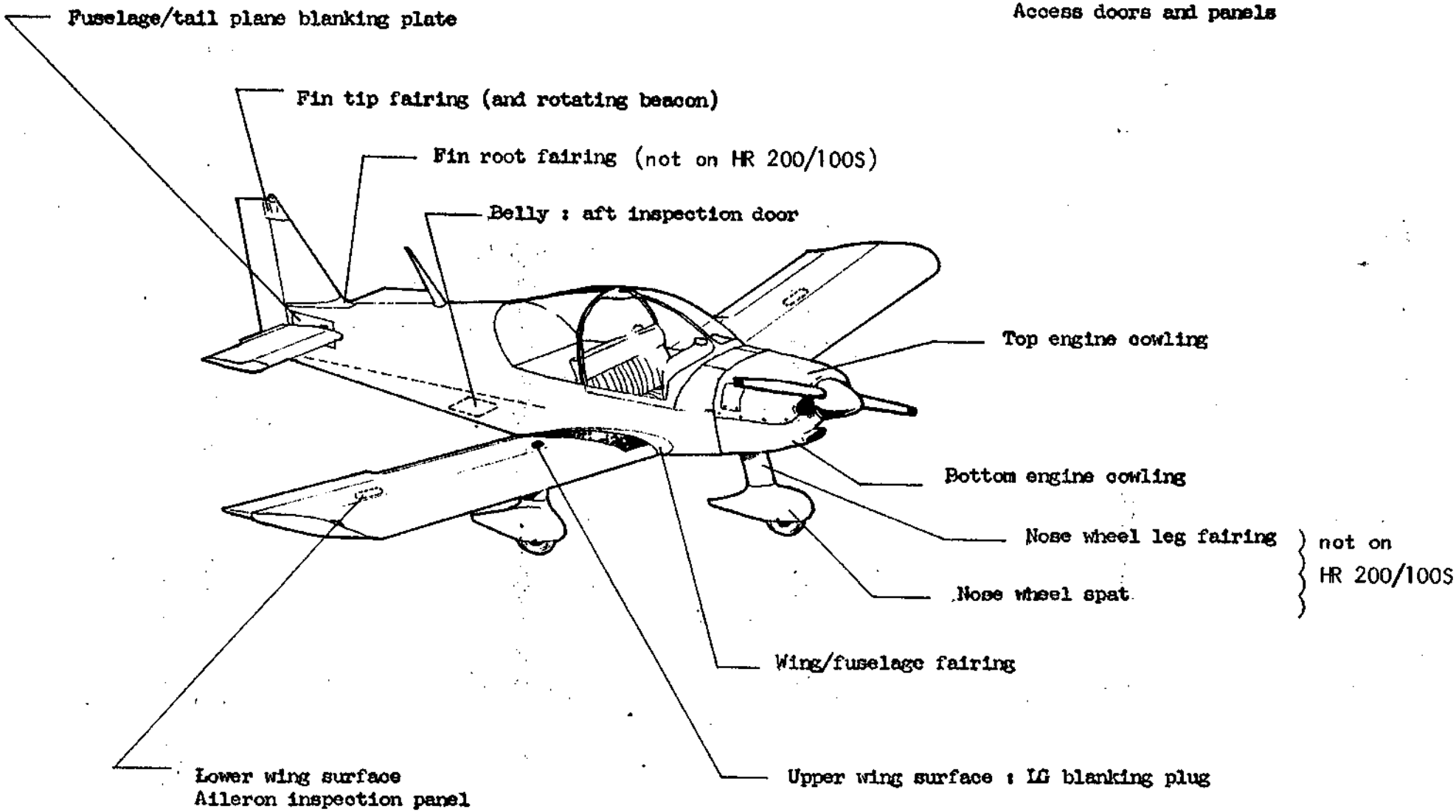
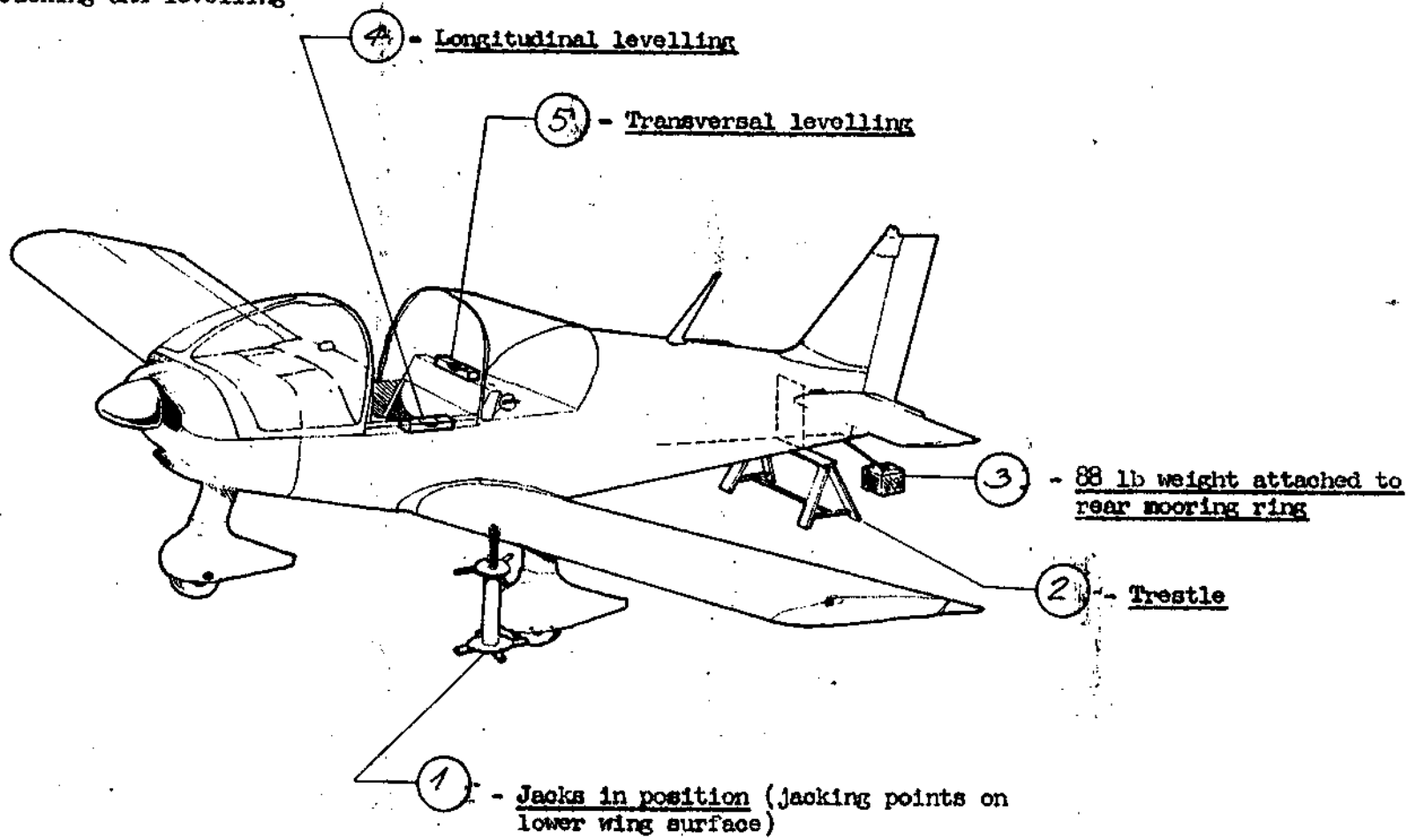


Fig. 4 - Pre-inspection operations

Jacking and levelling



2.9 - Weight and balance

The installation of any additional equipment, or the displacement of any existing equipment on the HR 200 aircraft, to another location either in the cabin or on the power plant, will be cause for re-weighing. Similarly, the point of origin indicated on the Weight and Balance Sheet supplied by the Constructor, will have to be modified.

Aircraft weighing and balancing is carried out as described below.
These operations must be carried out inside the workshop, in a flat and clean area.

1 - Preparation for weighing :

- Normal aircraft equipment must be in position. Remove all luggage or foreign objects from the cabin. The fuel tank must be empty (check by means of the purging cock). The fuel pipes, selector cock and fuel filter (fuselage) must also be emptied.
- The oil system must be full. Top up if required (up to the "6" mark provided on the dipstick).
- Handbrake ON : press the brake pedals fully and, while maintaining the pressure, pull the handbrake control (without forcing) then, release the brake pedals.
- Remove the LG leg fairings and wheel spats. During the weighing operation, these elements will be placed on the scales, next to the corresponding wheel.
- The main and nose LG oleo legs must be fully extended. To this end, locally make up 3 wedges of hard material (wood, metal, fibre) which will be placed between the oleo legs and the fixed legs (see fig.5). Provide each wedge with an attachment means (leather strap and buckle, fabric strap and press-studs) to secure it to the landing gear during the weighing operation.

2 - Positioning of aircraft on the scales :

- The aircraft is now ready for weighing. Use scales with a minimum capacity of 660 lb (300 kg).

Two procedures are possible :

a) - Using the jacks
b) - Using man-power : Three persons are required to carry out this operation. Two of them lift the left wing while the third one places the scales under the left wheel. The same applies for the other side. With regard to the nose wheel, two persons (one on each side of the fuselage) will press down on the top of the fuselage, close to the fin/fuselage fairing, forward of the tail plane while the third one places the scales under the nose wheel.

- Once on the scales, the aircraft must be levelled up (see pages 2.12 to 2.14).

- Ensure that the canopy is closed and latched and that the towing bar, luggage straps and canopy cover are correctly stowed in the cabin.

3 - Adjust the scales and record the indicated weights.

2.10 - Balancing

The C of G of the HR 200 is determined by calculations, using measurements taken in the workshop.

- The aircraft must be set on a flat, clean floor.
- The oleo legs must be fully extended by means of wedges (see fig. 5).
- The aircraft must be levelled (longitudinally and transversely), as described on pages 2.12 to 2.14.

2.11 - Determination of measuring points

- The measuring points are determined with the help of a plumb line (sharp point).
- On the floor, mark the following measuring points :

  . axis of each wheel (axis of wheel axle).

  . wing leading edge (the correct location is on the upper wing surface, on the outer rib next to the LG and immediately after the LG filling/inflating plug. On this rib, the upper line of rivets leading to the LE will be used to locate the plumb line).

  . Using a wooden or light-alloy straight edge (11 to 13 feet long), trace on the floor a line crossing the 2 LE measurement points. On this line, measure :

  L1 = distance between the LE line and the axis of the left main wheel. Repeat on the right hand side, to obtain L1 left and L1 right.

  L2 = distance between the LE line and the axis of the nose wheel.

2.12 - Weighing of tares

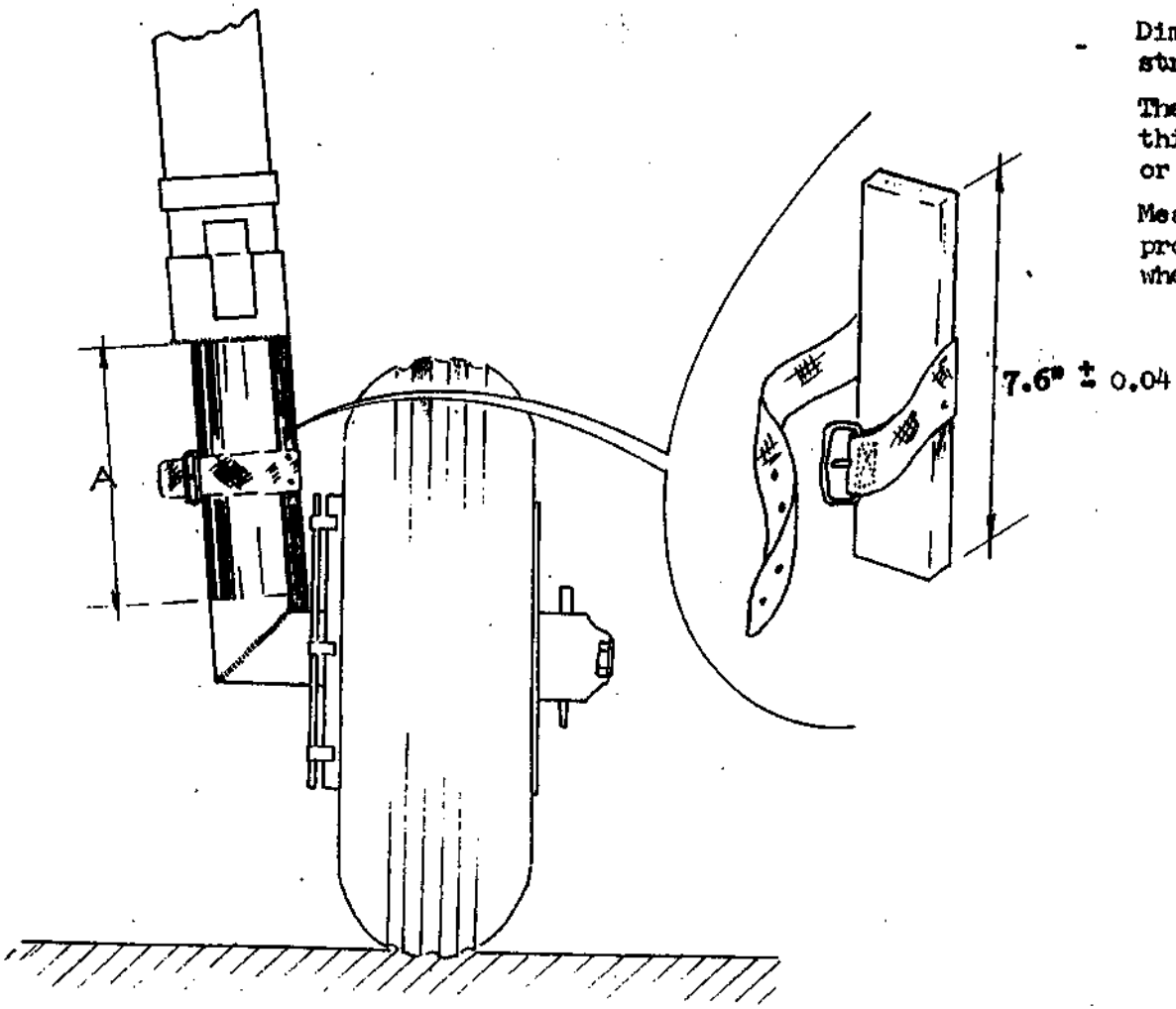
- With the aircraft in normal position on the ground, weigh the oleo leg extending wedges and the wedges used to level the aircraft on the scales.
  In the maintenance and overhaul workshop, these wedges will form part of the normal weighing equipment for HR 200 type aircraft. Consequently, they may be brightly painted (preferably with a fluorescent paint) and marked :

  "HR 200 - LG wedges - Weight = ... kg (lb)"

  They can then be included in the overhaul tooling kit.

All the measurements and weights recorded during the weighing and balancing operations shall be entered on the Weighing and Balancing Sheet, a specimen of which will be found on the next page.

Fig. 5 - Oleo-leg wedge



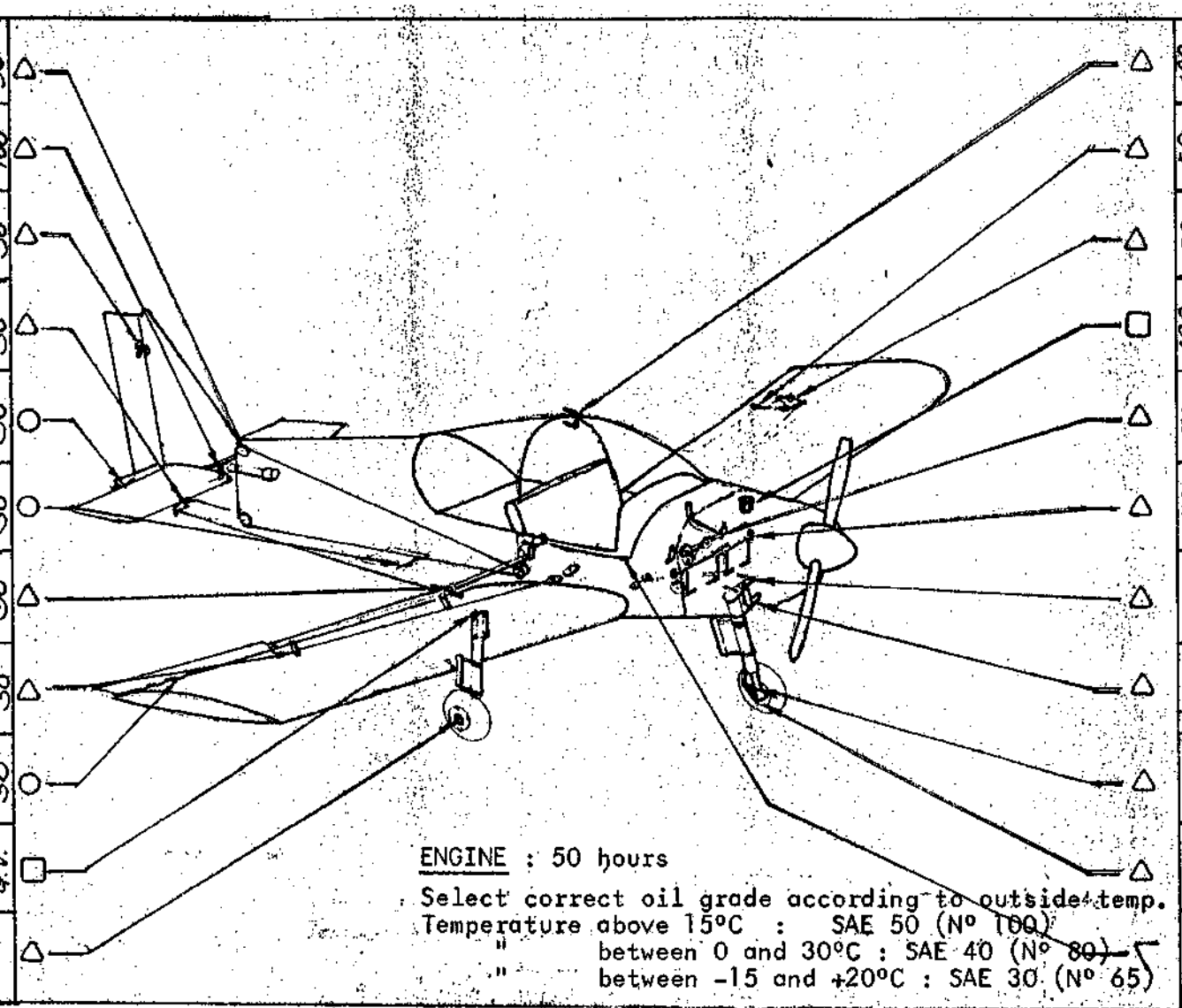
Aircraft jacking, levelling and weighing procedure

Dimension A corresponds to the oleo-leg max. stroke of 7.08" (180 mm - long stroke).

The oleo-leg extending wedge illustrated on this figure will be made of wood, light-alloy or fibre.

Measuring 7.6" in length (± 0.04), it will provide full extension of the sliding leg when in position:

Elevator pulleys	50	Canopy latching system
Horizontal stabilizer hinge pin	100	Aileron control ball and socket joints
Upper rudder hinge pin	50	Aileron bellcrank
Lower rudder hinge pin	50	Brake fluid level
Elevator anti-tab hinge	50	Control stick bearings
Belly trap door hinge	50	Rudder bar bearings
Flap control tube bearing	50	Nose wheel steering linkage
Flap bellcrank ball and socket joints	50	Nose wheel pivot point
Aileron hinge	50	Torque links
LG fluid level (main and nose)	4 V.	Wheel bearings and axle
Wheel bearings and axles		Sliding canopy guide rails and pads 50



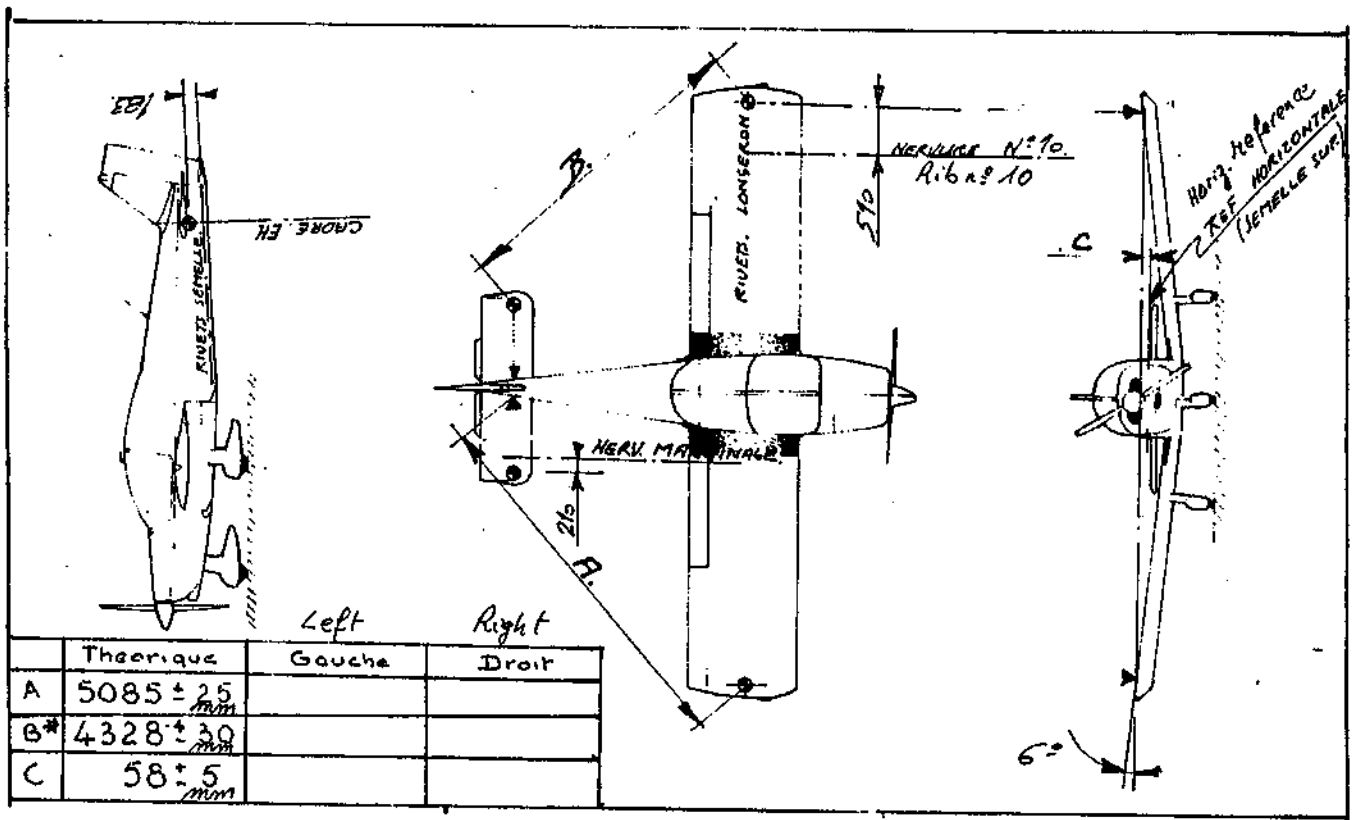
ENGINE : 50 hours

Select correct oil grade according to outside temp.
Temperature above 15°C : SAE 50 (N° 100)
" between 0 and 30°C : SAE 40 (N° 80)
" between -15 and +20°C : SAE 30 (N° 65)

Oil AIR 3511
Grease AIR 4210 A
Oil AIR 3520
Special lubricant WYNNS

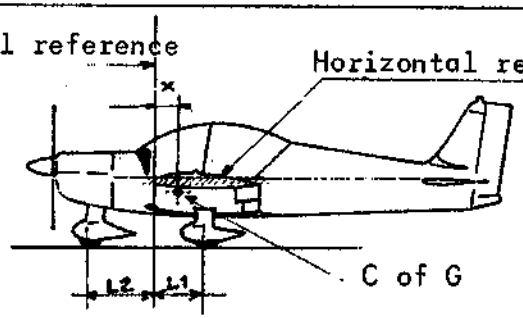
Engine oil Oil change :

Complete oil change after the first 25 flying hours (from new
Refill with clean oil
Subsequent oil changes : every 50 hours

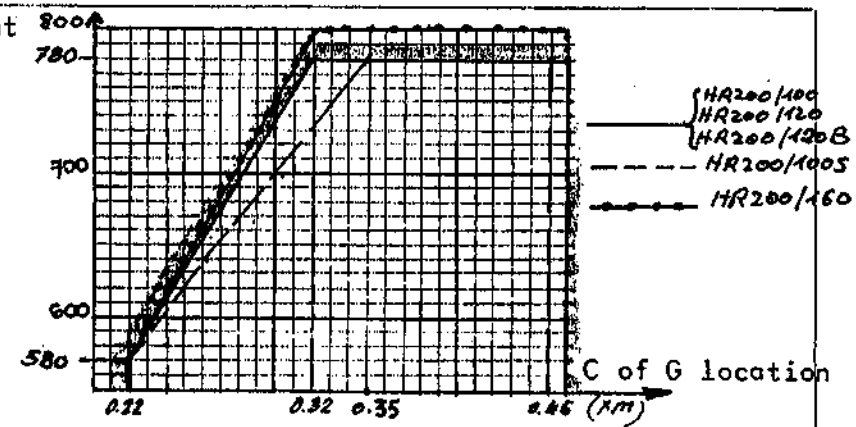


	Theorique	Left Gauche	Right Droit
A	5085 ± 25 mm		
B*	4328 ± 30 mm		
C	58 ± 5 mm		

* 4207 ± 30 mm if modification nr 10 applied on HR 200/100 and HR 200/120
4207 ± 30 mm on HR 200/100S, HR 200/120B and HR 200/160 (standard)



Reference chord : 1500 m



Limit weights and C of G locations

- Weighing :
- Oil system full :(liters)
- Fuel :
- Equipment (see up-dated inventory) :

	Weight (kg) Gross	Tare	Net	Lever arm (m) Oleo-legs extended	Moments (kgp.m)
RH main wheel				L1 =	+
LH main wheel				L1 =	+
Nose wheel				L2 =	−
			Weight empty:	kgp	Moment :

Position of C of G (aircraft empty) rearward of vertical reference :

$$\boxed{X} = \frac{\text{Moment}}{\text{Weight}} = \quad = \boxed{}$$

Date of weighing :

Inspection :

AVIONS PIERRE ROBIN HR 200	Weighing-Balancing sheet	Serial n° :	Registration :

TABLE OF EQUIVALENT LUBRICANTS AND SPECIAL PRODUCTS

Products	Standards			NATO Code	Description - Use
	French	U.S.A.	U.K		
OIL	AIR - 3511	MIL-L-6085 A	DTD 822.A	0.147	Low-freezing point lubricating oil. General purpose.
GREASE	AIR - 4210 A	MIL-G-23827 A	DTD 844.B	G.354	Special synthetic grease, general purpose, from - 73°C to + 121°C.
OIL	AIR - 3520	MIL-H-5606 A	DTD 585	H.515	Very low freezing point mineral hydraulic fluid for hydraulic systems.
GREASE	AIR - 4214 B	MIL-G-6032 B Type 1	DTD 844 B	G.363	Hydrocarbon-resisting grease for fuel and oil seals and valves.
Special product	WYNNS				Lubricant for sliding canopy (guide rails and pads)

Lubricants : We recommend the use of BP and Wynns products.

SECTION 3

FUSELAGE STRUCTURES

3.1 - Structures

There are two types of structures :

3.1.1 - Primary structures

These cover large resistant assemblies or frames :

- fuselage
- wing
- control surfaces
  - . ailerons
  - . flaps
  - . horizontal and vertical stabilizers
  - . elevator anti-tab
  - . fin

All these elements are subjected to a rigorous inspection, during production in the Avions Pierre Robin workshops. Each of them plays an important role where safe flying is concerned.

3.1.2 - Secondary structures

This category covers all structural parts others than those listed above.

The main and nose landing gears, the power plant and airborne equipment are covered in separate chapters.

3.2 - Inspection of structures - Corrosion

The periodical inspection of structures must permit the systematic detection of all forms of corrosion mainly encountered in metallic construction.
The most current forms of corrosion are :

A - Abrasion (fretting, chaffing) :

- rubbing and wearing of 2 parts with a relative movement, either desired (hinges) or non desired (incorrect assembly, loose bolt or rivet).

Cure : In the case of continually moving pivot or hinge pins, adequate lubrication (within the framework of a proper periodical inspection and servicing) will provide the solution.

In the case of abnormal rubbing, due to incorrectly assembled or worn parts, the replacement of the loose bolt or rivet will necessitate :

1 - a more thorough inspection of the area concerned, in order to find the cause(s) of this trouble.
2 - the strict observance of the Constructor's instructions, when certain repair or replacement procedures are authorized.

To prevent rubbing of metallic parts, it is recommended to use a film of special compounds, or anti-chaffing strips.

Authorized service station repairs (except those to be carried out by A.P.R.) will be dealt with in subsequent chapters.

B - Chemical corrosion :

Certain substances can dissolve others. A chemical reaction is not usually found on an aircraft used normally.

The concentration of SO^2 in the air and in rain water, is more critical close to built up areas and industrial plants (Lacq district, Northern region, ...), and anywhere where heating appliances (fuel) produce layers of excessively corrosive fumes.

Cure : A regular inspection, in a servicing station, frequent external washing of the aircraft, greatly reduce the risks of corrosion. Do not hesitate to carry out an internal check of the structures (wing, fuselage) through the inspection panels and doors provided.

C - Electro-chemical corrosion :

Two metals brought into contact by a liquid will form a "battery". One of the metals is decomposed to the advantage of the other.

The "battery" thus made is more active with sea water than with rain water.

Correct selection of assemblies, during the aircraft design phase, and the use of adhesive tapes, can prevent the formation of destructive "batteries". A neutral state (electrical insulation) is thus obtained in places where the condensation could promote such a formation. The same object is achieved by using zinc chromate paint on parts made of AU4G material, which are not protected by pure aluminium (A5).

It is therefore necessary to underline the importance of carrying out an internal inspection of the aircraft, more particularly at junction points between sections and skin panels, in the corners formed by the ribs and the skin, the stiffeners and sides, ...

In most cases, the corrosion of aluminium based light alloys is indicated by the presence of "blisters" on the surface of the material. These blisters contain destroyed inert particles of the corroded metal, in a white powder form.

Corrosion is often due to the climatic conditions prevailing where the aircraft is stored and used. We must strongly emphasize the importance of servicing inspection and of the frequency at which such inspection is carried out : the soundness of the structures is conditioned by it.

According to the amount of corrosion detected, it might be wise to seek the advice of the Constructor, in order to obtain the best method for preventing or repairing such corrosion.

However, in the case of minor corrosion and according to the thickness of the part affected, cleaning with fine grade emery cloth (grade 100 to 200 for example) and protection of the cleaned area with zinc chromate, will give satisfactory results.

In certain cases, it might be necessary to replace the skin panel affected by a new panel, in order to stop the corrosion from spreading. In these circumstances, the Constructor alone can decide.

Cleaning of corroded areas :

It is highly recommended to use a rubbing block over which the emery cloth is stretched and held in position by the hand of the operator.
Rub with a circular motion over an area whose diameter is approximately 4 to 5 times greater than that of the corroded zone.
It is also recommended to use successive grades of emery cloth, starting with the coarser grade (100) and finishing with the finer grade (200) to obtain a smooth surface.

3.3 - Structure inspection - Riveting

In his periodical servicing scheme for the HR 200 aircraft, the Repairer must include the inspection of rivet lines.
In this Maintenance Manual, the "Structural Repairs" chapter is not included : it is the object of a separate Manual.
If the aircraft has been badly damaged, it will be preferable to seek the Constructor's advice.
With regard to certain minor work or modifications approved by the Official Services and the Constructor, the Repairer must, furthermore :

a - use the recommended materials,
b - include in the workshop tooling all appropriate equipment and templates.

The object of the inspection procedure is to eliminate all loose, cracked or distorted rivets. Avoid all risks of starting cracks or breakage, do not ovalise rivet holes. To remove defective rivets, correctly centre-punch the head and drill to skin level with a drill whose diameter is equal to that of the rivet shank then extract the rivet with a drift. Certain drilling equipment can be equipped with guides to facilitate this operation.
In all cases (i.e. ovalised rivet hole, loose rivet), the hole will be enlarged to the next higher diameter.

3.3.1 - Riveting identification :

The Service Station repairer must scrupulously respect the content of the following paragraph.

The authorized riveting repair operations, by a Service Station, are as follows :

- Replacement of loose, cracked, distorted rivets on :
  - . wing ribs (nose and tail)
  - . tail unit ribs (nose and tail)
  - . fin ribs
  - . fuselage side stiffeners,

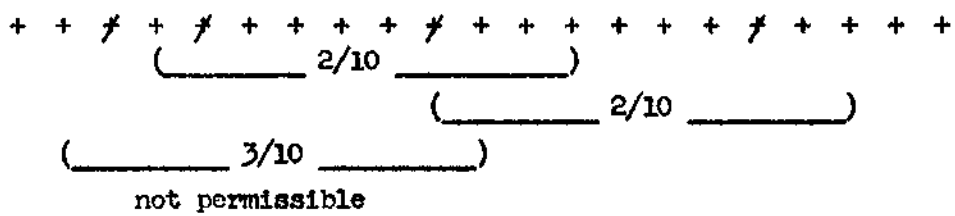
to the exclusion of all rivet lines located on wing, fuselage, vertical and horizontal stabilizer spars, and all zones of concentration where the riveting pitch is equal to, or lower than 25 mm (1"), which must be repaired after approval of the Constructor.

As a general rule, in all authorized Service Station repairs, the rivets to be replaced must never :

1 - be next to one another,
2 - be more than 2 out of 10, counted in any manner, on a same element,
3 - have a diameter greater than 5/32 (or 4 mm).

3.3.2 - Rivets out of tolerance :

Example of correct riveting :



not permissible

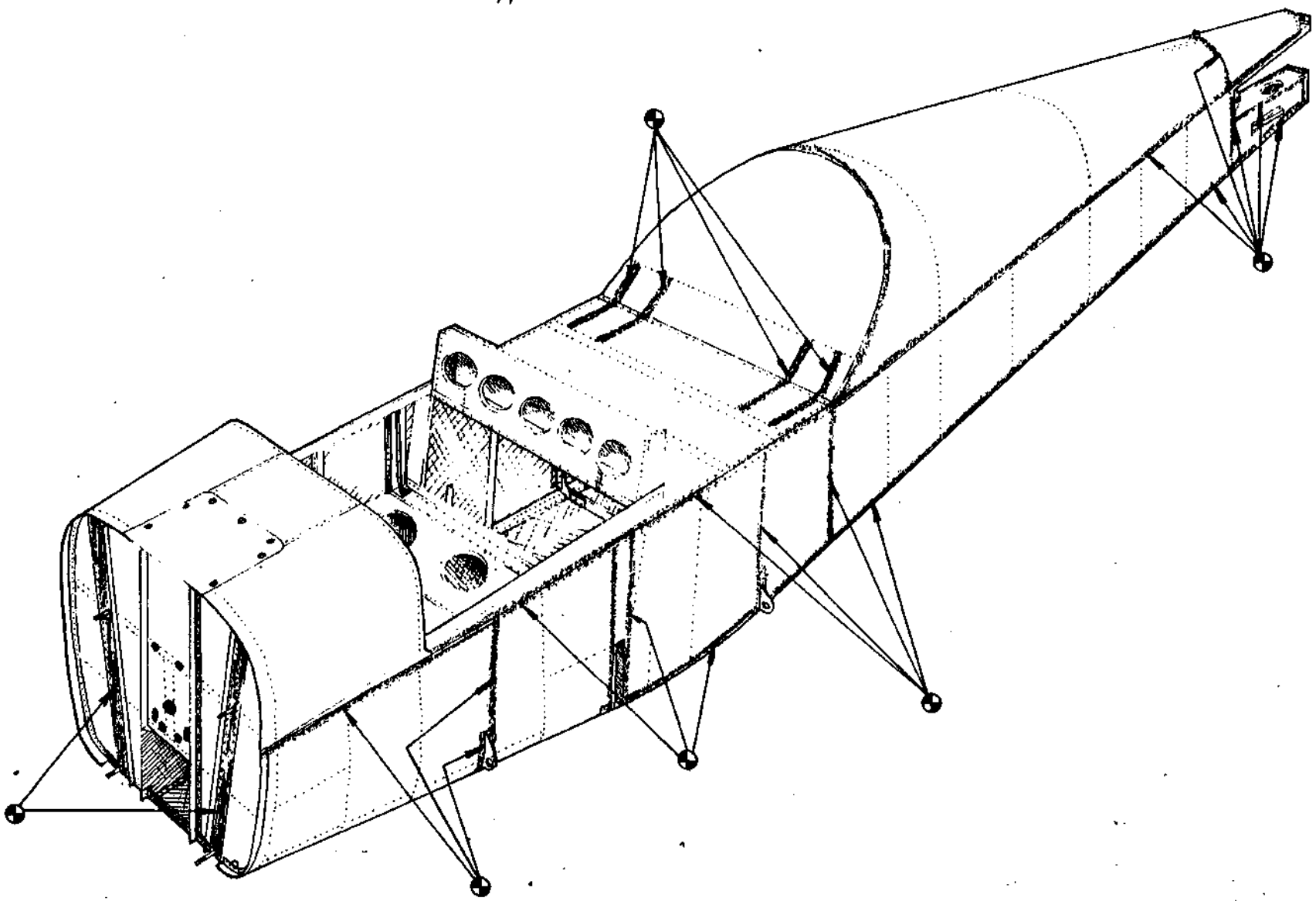
3.3.3 - Approved rivets - Drilling diameters

The Constructor recommends that all defective rivets be replaced by means of blind, AVDEL type rivets, as per the following table :

AVDEL reference n°	Type of head	Rivet diameter	Drilling diameter
1601.0410	Flat	3.2 mm	3.25 mm
1601.0512	Flat	4.0 mm	4.10 mm
1604.0412	C/sunk	3.2 mm	3.25 mm
1604.0514	C/sunk	4.0 mm	4.10 mm

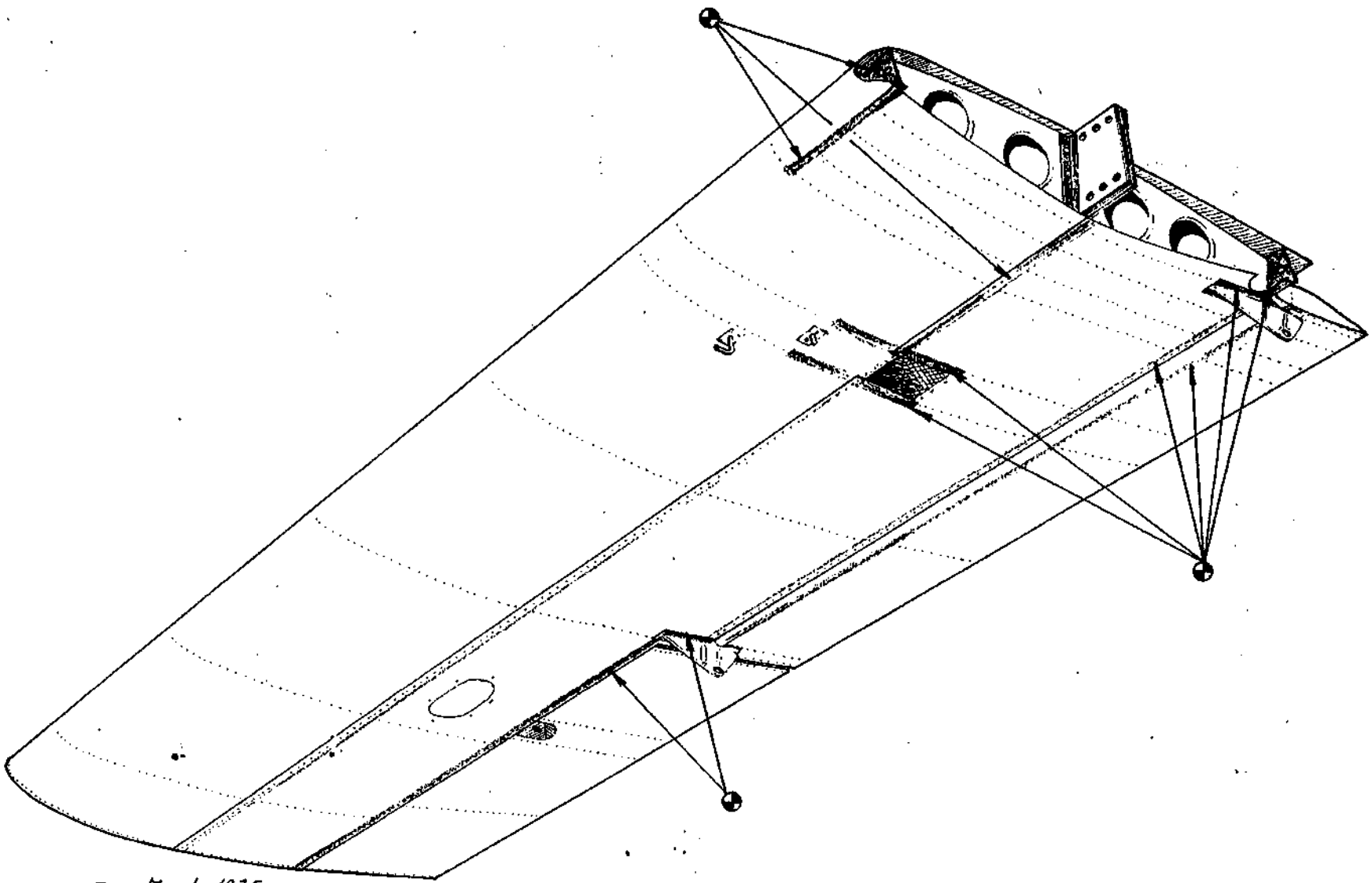
Structure maintenance : Fuselage

⊕ - Structural riveting lines
to be repaired after Constructor approval.



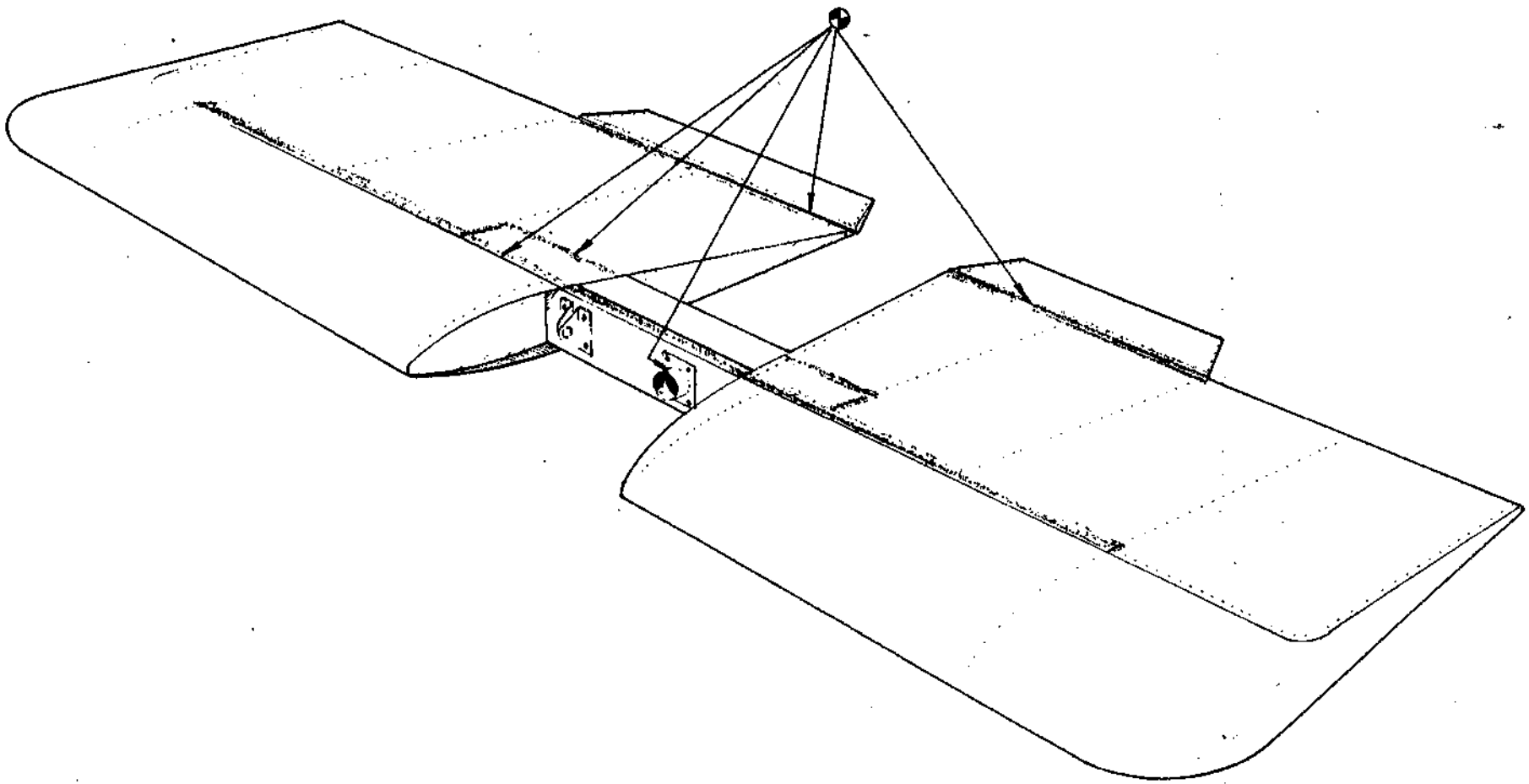
Structure maintenance : Wing

⊕ - Structural riveting lines
to be repaired after Constructor approval.



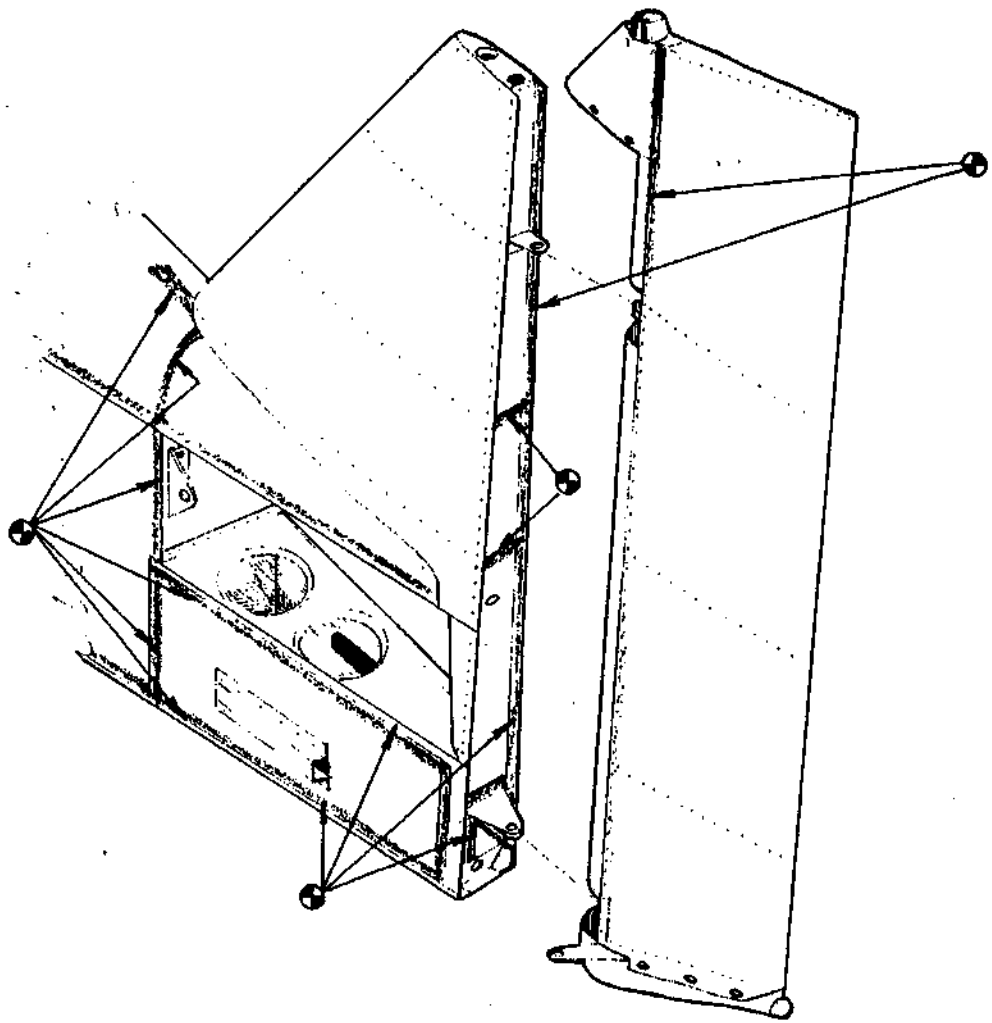
Structure maintenance - Tail plane

● - Structural riveting lines
to be repaired after Constructor approval



Structure maintenance - Fin and Rudder

- Structural riveting lines to be repaired by Constructor only.



3.4 - Fuselage inspection

3.4.1 - Firewall :

a) - Check stiffeners for correct riveting (cf. § 3.3 - Structural riveting), lack of cracks and signs of distortion on ribs.

b) - Ensure that a sealing bead is present around all parts secured to the firewall. The flexible sealing compound used at assembly is : SIKASTIC, ref. 732 R.T.V. in 12 oz cartridges.
If accessories sealed with this product have to be removed, separate the sealing bead with a "Stanley" type knife.

We recommend that Repairers, who have confidence in the long experience acquired by A.P.R., should use the products mentioned above.

c) - Nose landing gear support : in particular, check state of welds and ensure that no cracks are present. This element must be thoroughly inspected.

3.4.2 - Front tunnel - Instrument panel console :

a) - Inside tunnel : check riveting of sides, pulley and cable supports. Operate the controls to ensure that all pulley support attachments are satisfactory : rivets, bolts, nuts, locking devices ...

b) - Safety belts :
Ensure that the belts quick-release link attachment is correctly secured (in particular, the locking of the nut) (HR 200 aircraft equipped with shoulder straps for aerobatics).

HR 200 aircraft equipped with AIGLON 341-M3 type belts :

Extract from the 341-M3 Passenger Belts Overhaul Manual - Description and Operation :

1) - Description :

A - General : The object of the passenger belts is to maintain the passengers correctly seated during take-offs and landings, and whenever the Captain deems it necessary.
The passengers are attached to their seat by means of 2 straps secured at the front by a quick-release buckle and attached, at each end, to the airframe structure.

B - Characteristics : The passenger belt can withstand a total load greater than, or equal to 1350 kg (3000 lb).

C - Description (see fig. a) : The passenger belt is mainly composed of :

- 1 RH strap length (1)
- 1 LH strap length (2) to which the buckle (3) is attached.

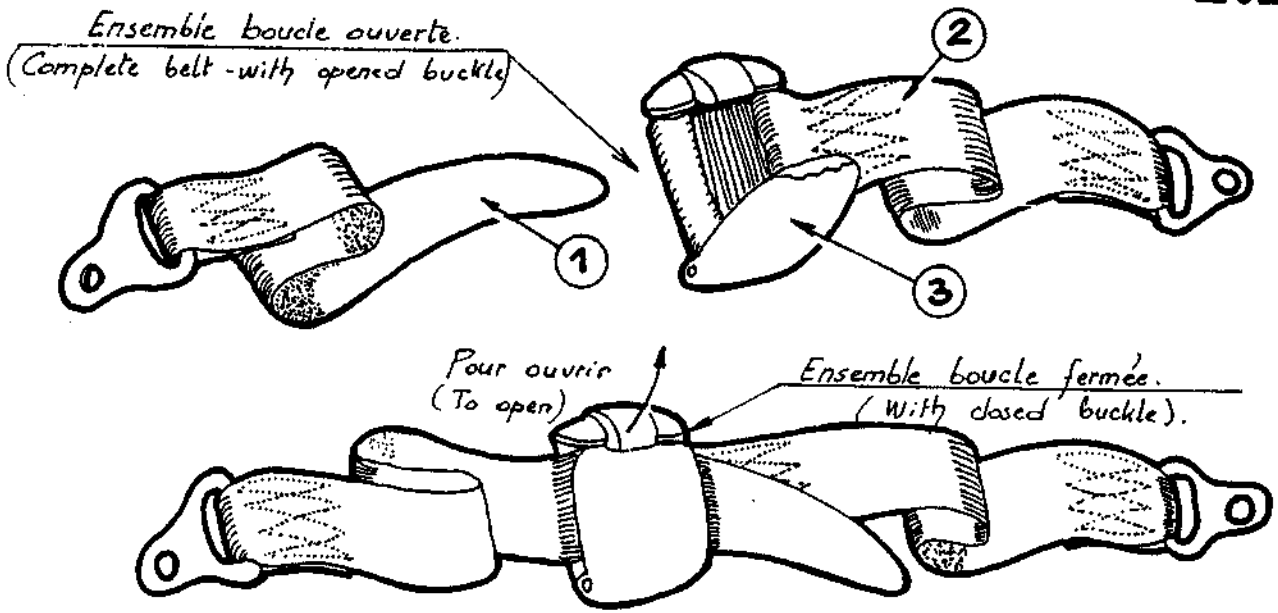
2) - Operation :

Each strap length is secured to the seat by means of a single attachment (ref. A.51 B). The buckle is of the articulated jaw type, closing up on a mobile cam (8). The correct tightness is obtained by closing the buckle at the desired point (fig. b).
To open, lift the locking clip (10) which frees the cap (5) and opens the jaw, thus instantaneously releasing the 2 strap halves.

NOTE : It is possible to adjust tightness with the buckle closed, by holding the buckle (3) with one hand and pulling, with the other hand, the end of the RH strap.
This is possible (fig. b) because in this case cam 8 is not actuated by the strap surrounding the frame (4).

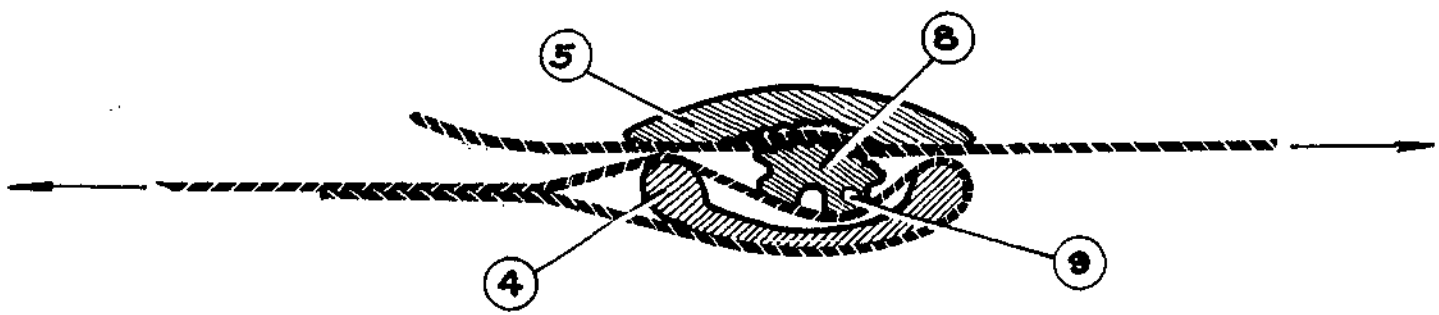
Schéma d'ensemble :
(Full schema)

Figure a).

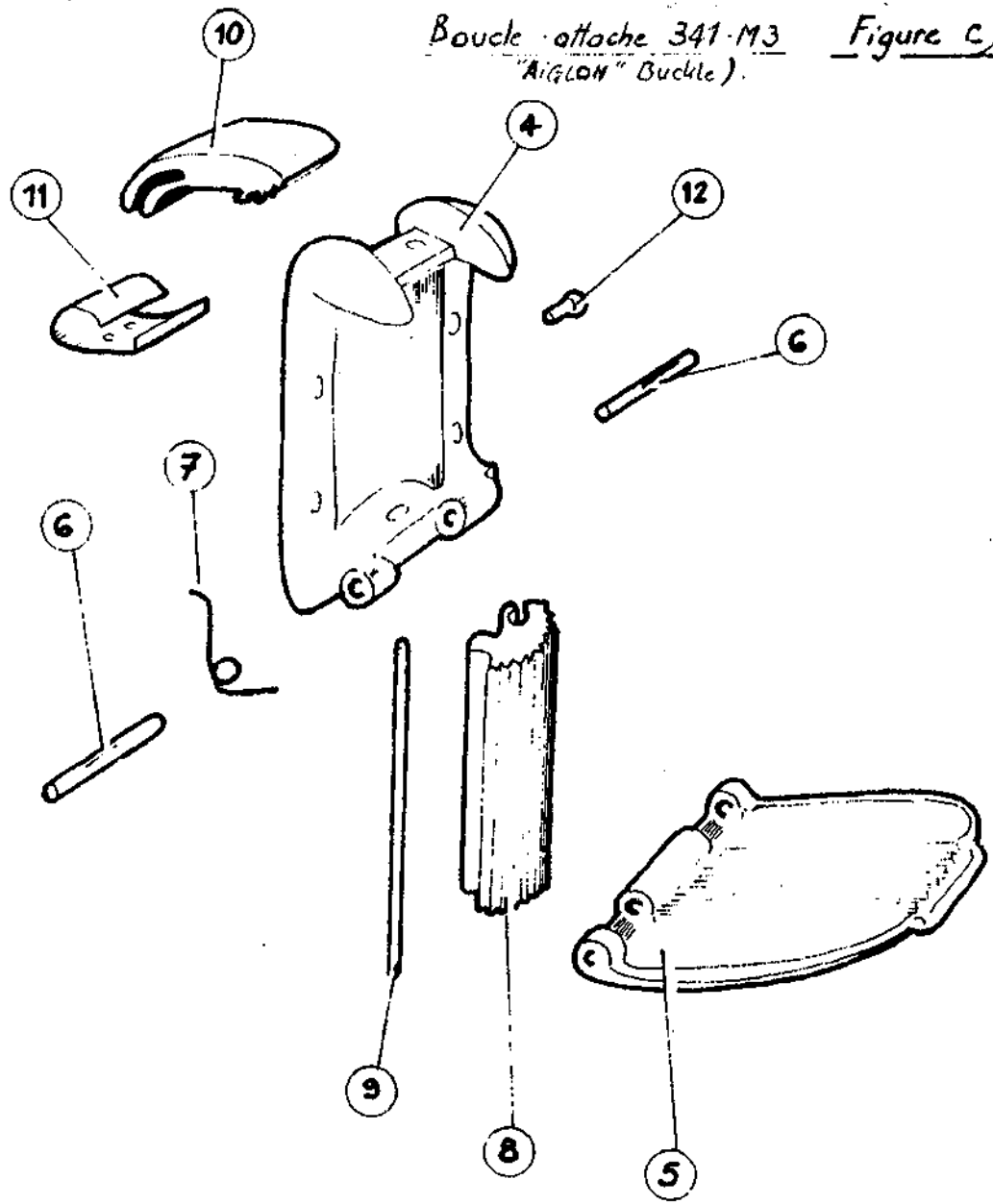


Détail du bouclage :
(Profile of the buckle).

Figure b).



Boucle attache 341-M3 Figure C/
"AIGLON" Buckle).



Nomenclature

Item	AIGLON ref.n°	Description
4	A.201	Frame
5	A.202	Cap
6	A.2020	Pin, cap hinge
7	A.2021	Spring, cap
8	A.206	Cam
9	A.2060	Pin, cam hinge
10	A.203	Clip, locking
11	A.2030	Spring, clip
12	A.2010	Rivet, strap

AIGLON Type 341-M3 Passenger Belt

Defective operation - Diagnostic and cure

Defect	Diagnostic	Cure
Buckle (3) locks with difficulty	Clip spring (11) stretched or broken	Change the spring
	Foreign body under cam heel	Remove foreign body
The cap (5) does not open automatically after release	Clogged up frame/cap hinge	Clean and lightly lubricate
	Cap spring (7) stretched or broken	Change spring (7)

Disassembly

1) - Disassembly of passenger belt buckle (3)

WARNING : For safety reasons, the makers recommend replacement of the unit, rather than disassembly.

A - Removal of locking clip :

This clip is attached to frame (4) only by means of its spring (11). Consequently, if spring (11) is broken, clip (10) will be detached. In the case where spring (11) is only stretched, force it in the direction indicated on fig. d and break it by levering as indicated on fig. e. Then, using a 4 mm dia. (max.) drift, extract cam pin (9) to release the remaining part of the spring and the cam.

B - Cap removal :

1 - Using a correctly centered 2.5 mm dia. drill, drill out one of the two pins (6) over its whole length and then, the central section of cap (5) separating the 2 pins (6).
2 - Through the hole thus made, introduce a 2 mm dia. rod and drift out the other pin (6).
3 - Through the hinge pin hole thus cleared, enlarge the 2.5 mm dia. hole to 3 mm (in the central hinge section of cap (5) only).
4 - Insert a 3 mm dia. rod and extract the other pin (6).

WARNING : Do not extract pins (6) with a rotary movement since the splines of the pins would damage the bores and prevent correct re-assembly.

Figure d

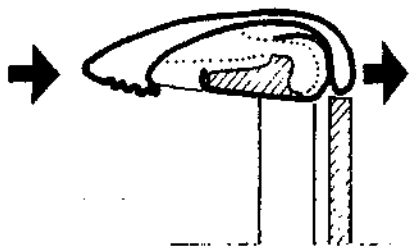
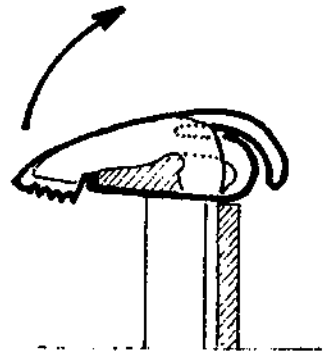


Figure e



Re-assembly

A - Re-assembly of locking clip :

1 - Fit a spring (11) in the recess provided in the clip (10) (fig. f).
2 - Place a thin, rigid blade between spring (11) and clip (10), as shown on fig. g.
3 - Engage the clip/spring/blade assembly through the back of frame (4), pushing on the back of clip (10), until it is fully home (fig. h).
4 - Extract the blade forward and position the spring with regard to the bore of cam pin (9).
5 - Position cam (8), and insert its hinge pin (9) fully home.

NOTE : If the original clip is replaced, check the fitting of the new clip (10) before assembly. In particular, ensure that the travel limiting heel coming into contact with frame (4) allows the opening of cap (5). Adjust its length if necessary otherwise the opening action will be more difficult.

B - Re-assembly of the cap :

1 - Position the cap (5) on frame (4) and fit a splined pin (6) from the right (facing the cap), the clip facing upwards.
2 - Fit a cap spring (7), ensuring that its short leg is in contact with the cap, the bent end of the other leg engaging a recess in frame (4).
3 - Fit the second splined cap pin (6).

NOTE : Lightly lubricate the 2 pins (6) before assembly (use melted Houghton 6.61 type grease)

C - Assembly of buckle on the strap :

1 - With the main buckle body assembled (i.e. including the following parts : frame (4), cap (5), cap pins (6) and cap spring (7) :

Insert the frame (4) in the loop of the strap (back of frame on the same side as the stitched end of the strap).

2 - Fit clip (10) and cam (8) as described in § A - Re-assembly.

3 - Fit the strap securing rivet (12).

° ° °

Inspection of disassembled parts

1 - Check state of straps and stitching :

a) Change the strap element checked if the following defects are detected : snags, holes, tears or nicks, burning, wear reducing the original thickness by more than 20%, marking which cannot be brushed off.

b) - Change the strap element checked if the stitching thread is broken.

c) - Clean off oil, grease and dirt stains, as well as dust, with a soft brush and soapy water (use soft soap or trichlorethylene).

2 - Check state of metal elements :

a) - Parts worn or distorted outside the tolerances laid down in the table of page 3.18 must be changed.

b) - If the parts checked are heavily corroded, replace them.

3 - Check buckle operation : if the quick-release action is deemed too weak or too stiff, check torque and moment values according to approval or maintenance requirements.

4 - Ensure that the securing holes of the single point attachments (8 mm dia.) are not elongated or otherwise damaged.

5 - Check the operation of clip (10) and, in particular, the action of its return spring (11).

6 - Check the dimensions of clip (10), pins (6 and 9), head of cap (5), state of clip hinge pin on frame (4), and state of serrations on cam (8) (not worn nor damaged).

7 - Ensure that the hinge between frame (4) and cap (5) is freely moving and correctly biased by spring (7).

8 - Buckle lubrication can be carried out only when detached from the strap (melted Houghton 6.61 grease).

Cleaning

1 - Clean all metal parts with trichlorethylene.

2 - Clean the straps with warm soapy water, rinse well and allow to dry away from light.

Storage

1 - Keep the passenger belts in a room at temperate temperature, away from sun light.

2 - Avoid damp or acid atmospheres.

Fits and clearances

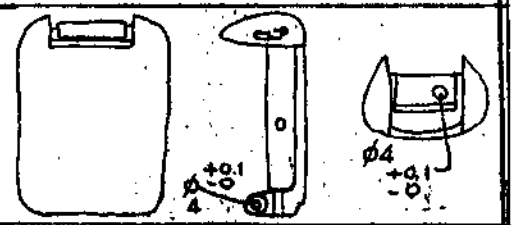
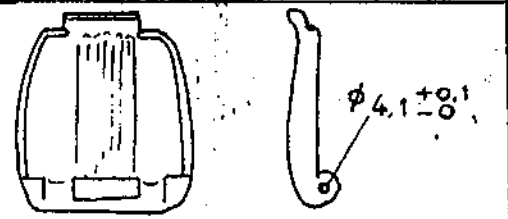
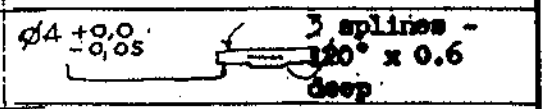
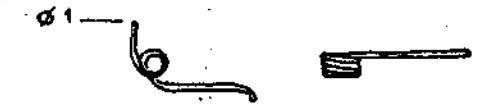
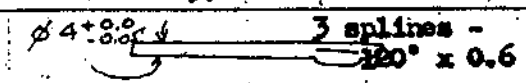
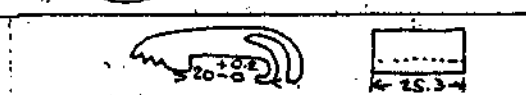
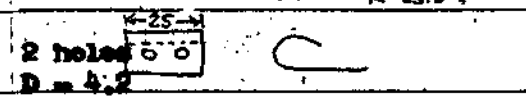
Item n°	Designation	Part n°	New part		Worn part		Remarks - Drawings
			Tolerance (mm)	Play (mm)	Tolerance (mm)	Play (mm)	
4	Frame	A 201					
	Hinge bore		D 4 + 0.10 - 0.00	Nil			
	Cam pin bore		D 4 + 0.10 - 0.00	Nil			
5	Cap	A 202					
	Bead thickness		D 4.6 + 0.10 - 0.00	0.250 to 0.100			
	Hinge bore		D 4.1 + 0.10 - 0.00				
6	Cap pins	A 2020	D 4 + 0.00 - 0.05	0.250 to 0.100			
7	Cap spring	A 2021	coil i.d. 4.6 ± 0.20				
8	Cam	A 206	L 51 ± 0.25 pin D 4.2 ± 0.10	0.100 to 0.300			
9	Cam pin	A 2060	D 4 + 0.00 - 0.05				
10	Clip	A 203	size 20 ± 0.20				
11	Clip spring	A 2030					
12	Strap rivet	A 2010					

Figure f

Figure g

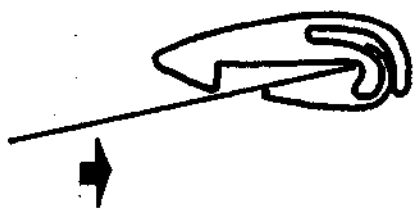
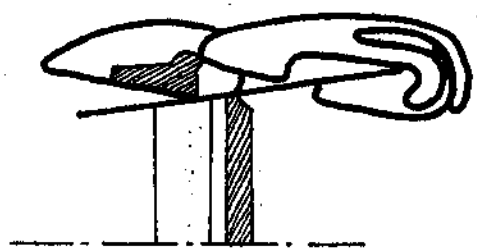


Figure h



3.4.3 - Battery tray

a) - Check riveting on firewall.
b) - Check for possible cracks on bent sections.
c) - Check for signs of corrosion, between tray and firewall.

3.4.4 - Inspection panels and doors

a) - Check securing means (there must be no play when pressed with the finger)
Dzus fasteners : if necessary, adjust the "S" spring.

b) - Lower wing surface panels :

- Check Parker type screws for security. After several disassembly and re-assembly operations, it is recommended to fit a larger diameter screw. This decision is left at the discretion of the Repairer.

c) - Blanking panels on tail unit

- Check security of metal screws.
- Check state of Nylstop nuts.

3.4.5 - Landing gear support frame

a) - Check support frame welds. Repairs can be effected only by an approved welder * or by the Constructor.
(* Welder licence : applicable to the metal concerned, approved by Official Services : Technical Service, Bureau Veritas, ...).

b) - Check the flatness of the LG frame panel. Buckling might have been caused by a hard landing. If this is so, the Repairer must carry out rigging checks.

3.4.6 - Tail skid

a) - Check attachment to fuselage.

b) - Ensure that the spring blade is not weakened, cracked or bent.

3.4.7 - Instrument panel

a) - Ensure that all securing screws are present.

b) - Check state and attachment of silent-blocks.

3.4.8 - Sliding canopy

a) - After removal of side trimmings and fuselage spar cover, check the attachment of the canopy guide rails.

b) - At 50 and 100 hour inspections, clean guide rails with acetone and lubricate (see lubrication chart).

c) - Check attachment of Teflon pads. These pads must be perfectly clean.

d) - At the 50 hour inspection, check the canopy jettisoning mechanism as follows :

. Take position in the pilot's seat.
. Remove the 2 screws securing the jettisoning handle locking wire.
. With the canopy moved forward sufficiently (allowing passage of a hand's width), pull the two jettisoning levers, as indicated by the marking. Ensure that the mechanism is operating freely and, if necessary, lubricate with oil (AIR 3511 Standard) through the gap of the levers (with an oil can).
. When fitting the canopy back in position, ensure that the slides are correctly engaged in the jettisoning rollers.
. Wire-lock the lever and secure with the screws.

3.4.9 - Canopy locking handle

a) - Check state of latching hook (cracks, normal contact marks at bottom of groove).

b) - Lubricate the hook as indicated in the lubrication chart.

c) - Check attachment and sealing of outside handle. In case of leaks, change the rubber seals.

3.4.10 - Outside cabin access handle

a) - Check attachment on rear plexiglass element (cabin LH and RH sides).

b) - Check sealing at attachment points.

3.4.11 - Static vent (fuselage side)

a) - From the inside (access through belly inspection door), check the attachment of the static vent on the fuselage side skin (inside nut locked) and the security of the rubber ASI tube on the connector.

b) - From the outside, check that the static vent orifice is not blocked. Clean frequently, particularly before each flight.

SECTION 4

WING STRUCTURES

4.1 - Wing attachments

4.1.1 - Main attachments :

- Wings in position : Check the fuselage assembly bolts (2 x 6) for tightness. If necessary, check rigging (page).
- Wings removed : Wing disassembly is effected as follows :

1 - Inside the cabin, remove the bench seat and the rear fuselage partitioning cover.
2 - Release the aileron control cables. The interconnecting tensioners are located in the LH and RH wing (2) and in the fuselage (1), visible on the rear floor section.
3 - Remove the wing/fuselage fairing (in 2 parts : 20 screws on front part, 10 on rear part).
4 - Disconnect the flap linkage rods, by unscrewing the bolts of the rear ball and socket joints. Take care not to let the flaps drop on their own as this might cause :

- tearing of the flap-wing bonding braid,
- cracking of flap shoes.

5 - In the inside rear fuselage section, disconnect :

- the electrical circuits : nav. lights, landing lights, Pitot head heater, stall warning device.
- the braking system : pipes and connectors.
- Pitot head system : Rilsan piping.

6 - Remove the bolts from the front and rear wing attachment points.
7 - Inside the cabin, remove the BTR bolts (2 x 6) securing the wing spar to the fuselage box section.
8 - Check state of wing - fuselage spar caps. Over a length of 150 mm (6"), on either side of each end, there must be no signs of scratches, cracks or hammering.

At re-assembly, proceed in the reverse order.

4.1.2 - Front and rear attachments :

- Check the riveting of the attachment points, on the fuselage and on the wing.
- If the riveting is defective, repairs cannot be effected by the Service Station. The Constructor alone is authorized to carry out such repair work.
- Check tightening torque of attachment bolts (see table).

4.1.3 - Flap shoes :

- The flap shoes support the flap bellcranks, on the wing undersurface.
- Check riveting of shoes on wing (Constructor repair).
- In particular, check the lower tip of the shoe, at the root of the slot through which passes the bellcrank. Letting the flaps drop on their own might cause cracking of the shoe edge and loosening of the first securing rivets.

- Check the bends of the shoes, the internal protective finish, for possible signs of corrosion where in contact with the wing (which might be caused by water projections and dampness, on the ground).

4.2 - Attachment of main landing gear leg

- After removal of wheel spat and leg fairing, check leg attachment for security on the wing spar.
- Check tightening torque of bolts. (see table).

Main landing gear removed :

- Check riveting of stiffeners and ribs on the landing gear well (Constructor repair).
- Following a hard landing, check the wing upper and lower panels for distortion and, in particular, the edge of the landing gear well.

4.3 - Polyester fing fairing

- Wings in position : check attachment of fairings (all screws must be present).
- Check state of polyester material (cracks, splits, superficial crazing of gel-coat).

SECTION 5

FLIGHT CONTROLS

5.1 - Dual stick assembly

a) - First, from the pilot's seat, check the stick for freedom of movement (elevator and ailerons). Carry out this operation gently to detect any possible high spots or signs of catching.
b) - Check state of fibre pulleys for wear. If marked by the cable, fit new pulleys. Lubricate pulley shaft and bearings (see lubrication chart).

Stick in position :

- Check play at stick base : shafts and fittings.
- Check that bolts are tight and locked.
- Check routing of cables, in pulley cable guides.
- Check routing of electrical cables and ASI piping in the vicinity of the stick.
- Check security of cable fittings : interconnection and elevator : pins, washers, locking.
- Check cable tension (see cable tension table).
- Lubricate all control stick pivot points and cable fittings (Standard : AIR 4210 A).
- Check state of control stick support brackets (LH and RH) when the sticks are actuated : riveting, security (this check can be carried out only when the tunnel shields are removed).

Stick removed :

- Check welds on control stick, if necessary, carry out a crack detection test (ARDROX process for example).
- Ensure that the tubes of the stick leg are straight and that the elevator control bellcranks are not distorted (the 2 bellcranks are welded perpendicularly to the stick base).
- Check state of bronze bushes at stick base : no scoring or peening. Check alignment of both bushes.
- Check alignment of the two control sticks, one with regard to the other.
- Check state of the sticks : abnormal signs of bending.

5.2 - Aileron control and interconnecting cables

a) - With the cabin side trimmings removed, check routing of aileron control cables through central tunnel and in fuselage sides. The cables must not contact the skin otherwise open up the passage hole. Do not forget to refit the Nylon grommet (PLIO-BOND Dx 1.P supplied by S.E.S., rue Delemont, 68300 Saint Louis).
b) - Check attachment of guiding pulleys and pulley grooves. If marked by the cable, fit a new pulley.
c) - Check locking of pulley spindles and presence, on each bracket, of the pins which prevent the cable from jumping out of the groove.
d) - At re-assembly, ensure that the head of the pulley spindles are facing upward (Aeronautical Standard, Bureau Veritas).
e) - On rear bottom fuselage panel : check riveting of interconnecting pulley bracket.
f) - Check locking of cable tensioners.

5.3 - Ailerons

5.3.1 - Inside wing :

Aileron bellcrank : check state of welds
check presence of the 2 adjustable stops and security of lock nut.

Ball and socket joints - Distance pieces : check security of bellcrank bolt on wing.
check security of bellcrank bolt on aileron control ball and socket joint.

Bellcrank bolt and distance piece on wing rib : when re-assembling the bellcrank, do not forget to refit the distance piece on the main bolt. Check length of distance piece : 50.5 mm + 0, - 0.2 mm. If out of tolerances, through wear, fit a new distance piece (Constructor).

Bellcrank stops : ensure that the bellcrank rubber stops are in contact with the rib when the aileron controls are fully deflected.

Procedure : One operator in pilot's seat
Lower wing surface inspection panels removed
Stick fully to the left
A second operator ensures that : in the LH and RH wing sections, the rubber stops are in contact with the rib and, using a checking template, that the aileron deflection angles are as laid down by the Constructor (see Control Surface Movements table).

Proceed similarly, with the stick fully to the right.

Aileron control and interconnecting cable tension : Adjust by means of the tensioners located inside the rear fuselage section.

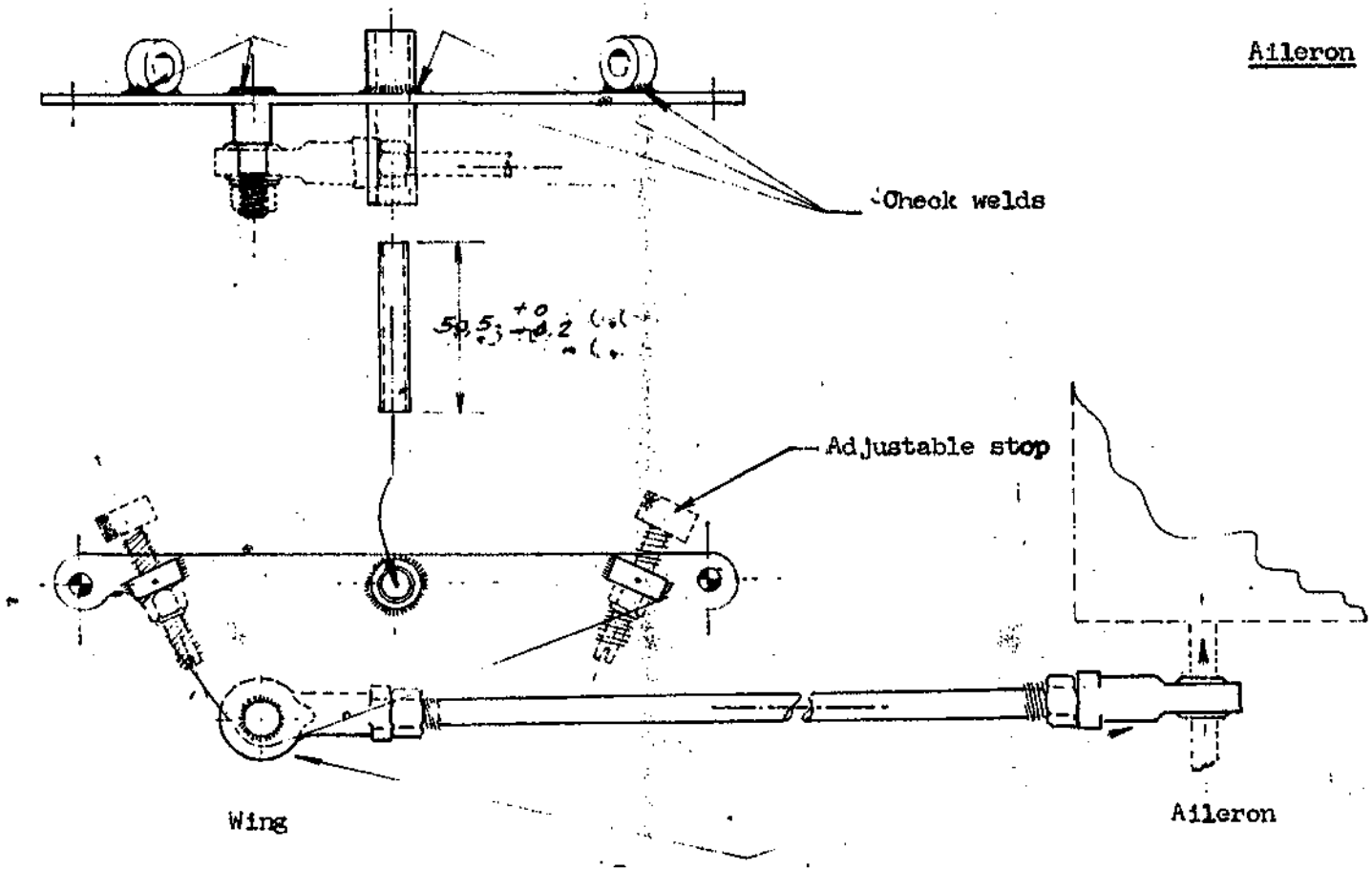
Aileron control : 2 tensioners - 1 on the left and 1 on the right, behind the bench seat, inside the fuselage.

Interconnection : 1 tensioner - inside the fuselage, on the centre of the bottom panel (LH side).

5.3.2 - Aileron control surface :

a) - Check state of hinge. Lubricate with oil and actuate the control. Wipe off any excess oil with a dry rag.
b) - Check security of control ball and socket joint bolt, on aileron end rib.
c) - Check riveting of aileron balancing section (Constructor repair - See Section 3.3.1).
d) - Check security of aileron bonding braid, on the wing : terminals correctly crimped, braid undamaged, bolts tight.

NOTE : For HR 200/120 B : After adjustment of ailerons control cables check the force necessary to bring
HR 200/100 S : back the stick in neutral position (return spring deconnected). This force must
HR 200/160 be less than 610 g (1.34 pounds)



Aileron : Checking points on bell-crank, inside the wing.

Ball and socket joints set 90° apart from one another.

5.4 - Flaps

5.4.1 - Flaps control :

(inside fuselage)

a) - Check security of flap control motor bracket, on the structure.
b) - Check security of flap control motor, on the bracket.
c) - Check state of the flexible rubber drive, between motor and reduction gear. This check is possible only after removal of bracket.

5.4.2 - Access to flap control motor (2 possibilities) :

a) - Access through belly trap door (a lead lamp is needed, inside the fuselage, to permit inspection).
b) - Access from rear seat :

. remove the back rest (and the seat itself to prevent damage to the upholstery).
. the flap control motor is located on the left hand side of the fuselage.

5.4.3 - Toothed quadrant and stops :

a) - Check state of quadrant teeth (for abnormal wear).
b) - Check state and security of reduction gear.
c) - Check security of quadrant stops (fitted on arms secured to the quadrant).
d) - Check locking of flap control tube.
e) - Lubricate the supporting bearing (grease AIR 4210 A).
f) - Check security of flap position indicator, bracket, slide rod and indicator arm.

5.4.4 - Flap control : outside fuselage :

a) - Check state of fuselage bearings (riveting, lubrication, wear).
b) - Check locking of the 2 bellcranks on control tube (after removal of wing/fuselage fairing rear sections).
c) - Check position of ball and socket joints on control bellcrank (fuselage side) and on flap bellcrank.
d) - Check locking of ball and socket joint bolts : the head of the bolt must be on the side of the control surface, because it is relatively thin and of the remaining space between the bellcrank and the surface. Presence of a steel washer and Nylstop nut, behind the bellcrank.

5.4.5 - Flap :

a) - Check state of control surface : skin, riveting (see chapter 3.3.1), particularly in the vicinity of the stepping board.

b) - On the lower wing surface, check the control bellcranks in the vicinity of the skin cut-out. There must be no signs of cracks or corrosion. Flap shoes : see chapter 4.1.3,(page 4.1).
c) - On the flap control bellcranks (lower wing surface), check the crimping and state of the ball and socket joints. Lubricate every 50 hours (grease AIR 4210 A) or more frequently if the aircraft is operated in dusty districts. In such a case, first clean with trichlorethylene, to remove greasy deposits, then lubricate with clean grease.
d) - Check bellcrank bolts for tightness and locking.
e) - Precaution to be taken during disassembly of flap controls, fuselage side : see chapter 4.1.1 - 4 (page 4.1).

(Do not let the flaps fall down as this might cause : tearing of flap/wing bonding braid, cracking of flap shoes. In this last case, replacement is compulsory and is carried out by the Constructor).

f) - When refitting the flap interconnecting rods, ensure that the ball and socket joint bolts are installed as described in § 5.4.4. d above.
g) - Check the movement of the flaps (see Control surface movements table).
h) - Following complete inspection of the system, actuate the flaps by means of the control located on the instrument panel, in front of the pilot.

. both flaps must move simultaneously, and without jerks : "take off", "landing" and "retracted" positions.
. check operation of warning lights.
. check operation of flap position indicator, on instrument panel.
. check the warning lights, on the workshop test bench.

5.4.6 - Stepping strip on flap :

When touching up the anti-skid zone, use the following product (in paint form) :

SCOTCH-CLAD anti-skid coating - 3 M Company - 135 Bld. Serurier - 75019 PARIS.
Tel. : 202 - 80 - 80

5.5 - Tailplane

5.5.1 - Inside fuselage : cabin (fuselage trap door, upper forward section, front tunnel removed)

- Behind instrument panel :

a) - On the elevator/aileron control stick, check security of cable fittings : pin locking, wear on edges of cable fitting.
b) - Check welds on elevator bellcrank controls.
c) - Check routing of elevator cables on forward pulley : presence, on pulley brackets, of pins preventing the cable from jumping out of the pulley groove. No contact with any part of the metal structure.

d) - Check state of pulley grooves. Uneven marking, by the cable, will necessitate replacement.
e) - Lubricate pulley spindles (grease AIR 4210 A).

5.5.2 - Front tunnel :

a) - Check cables routing inside the front tunnel.

5.5.3 - Rear fuselage section : access through : 1 - the belly trap door
2 - back of bench seat.

a) - Check state and security of the 4-pulley block (2 elevator pulleys, 2 rudder pulleys).
b) - On the bracket of the 2 central pulleys (elevator), check the presence of the pin which prevents the cable from jumping out of the groove.
c) - Check locking of cable tensioners.
d) - In the case of elevator cable disassembly and re-assembly, make sure that the short cable lengths are fitted back in position, behind the control surface.

5.5.4 - Elevator control surface :

a) - Check overall state of control surface :

. Riveting (see chapter 3.3.1).
. Skin (impact marks, cracks, corrosion).
. Fairing or tip (cracks, splits, crazing, other defects).

5.5.5 - Fuselage-mounted tailplane bearing :

a) - Check the crimping of the ball and socket joint fitted on each bearing.
b) - Check security of screws securing the LH and RH bearings.
c) - Lubricate every 50 hours (grease AIR 4210 A) or more frequently if operating in dusty districts (after cleaning with trichlorethylene).

5.5.6 - Tailplane bearing fitted on tailplane spar :

Assembled :

a) - Check security of brackets (two 5 mm dia. CHC screws on each bearing).

b) - Check tolerance of tailplane bracket holes : dia. 8 mm - H8 $^{+\ 0.02}_{-\ 0.00}$ (obtained during construction).

c) - Check for signs of cracks or corrosion in bearing corners, particularly at contact points between bearing and tailplane structure.

Disassembled :

d) - Check play in tailplane bearing bores. If exceeding 8 mm $^{+\ 0.3}$ in diameter, change the bearings.

5.5.7 - Balance weight :

a) - Check state of front and rear balance weight tube brackets : welds, riveting, protective finish.
b) - With the tailplane disassembled, check straightness of weight supporting tube.
c) - Check security of balance weight on supporting tube.
d) - Check state of weld securing the control cable attachment lug to the balance weight supporting tube.
e) - Check movement of elevator control surface (see table).
f) - From inside the fuselage (access through central inspection door), check the presence of the top and bottom balance weight travel stops.
Check security of yoke acting as stop (presence of Nylon fitting).

5.6 - Elevator anti-tab control

5.6.1 - Front tunnel (remove front tunnel shield) :

a) - Control system in position :

. check casing play by actuating the anti-tab control wheel. A certain amount of play is necessary for correct operation. If the amount of play is too great, the toothed wheel cannot drive the Teleflex cable. This can be easily checked by moving the control wheel and checking that its movement and that of the yellow pointer are synchronized.

. it is recommended to check the anti-tab control system at each 50-hour inspection : state, operation, play, lubrication.

b) - Casing disassembled :

. disconnect the control wheel from the casing : threaded taper pin, washer and 3 mm dia. Nylstop self-locking nut.

. remove the 2 screws securing the casing blanking plate.

. clean the inside of the casing (with engine fuel, trichlorethylene or acetone).

. check the toothed wheel. Change if teeth are blunted.

. lubricate the toothed wheel and its cage with fresh grease (AIR 4210 A).

. check Teleflex conduits connections and routing on front tunnel frame.

. check security of Teleflex conduit connectors on casing. Normally, but not excessively tight.

5.6.2 - Rear fuselage (access through rear belly trap door or behind bench seat) :

a) - Check passage of Teleflex conduit through the structure.
b) - Passage of conduit on LH side of 4-pulley block (rigid lug with clamp).

Inside rear fuselage section :

c) - Check routing of Teleflex conduit on frame members : lugs and clamps.

5.6.3 - Top of rear fuselage section :

a) - Check exit of Teleflex conduit through the one but last rear frame member : presence of rubber or Nylon grommet (type PLIO-BORD Dx 1.P, supplied by S.E.S., rue Delemont - 68300 Saint Louis).

5.6.4 - Tab control conduit stop :

a) - Check state of conduit clip.
b) - Check riveting of clip and protection of the assembly.
c) - Check locking of rigid Teleflex control brass nut and tightness of locking nut on conduit stop.
d) - Check security of locking nut of Teleflex control end fitting, on anti-tab double "T" fitting.

5.6.5 - Anti-tab double "T" fitting :

a) - Upper section (fuselage) : check security of attachment on "T" bearing and presence of split pins on either side of the 5 mm dia. pin.

b) - Lower section (Teleflex control) : check attachment of "double T" fitting bolt on tab rod : washer, castellated nut, split pin.

5.6.6 - Tab rod fork end fitting :

a) - On tab control surface : check attachment of fork end fitting : 2 x 2 CHO screws (BTR 4 mm dia. x 15).
b) - Check the welds on the distance piece connecting the two legs of the fork fitting.
c) - Check state of anti-tab double "T" fitting guiding slots. Lubricate copiously with AIR 4210 A grease.
d) - Check protective finish on fork fitting : no signs of corrosion (two protective processes possible : painting or cadmium plating).
e) - Ensure that the fork fitting does not rub against the structure (vertical spar) during control surface displacement.

5.6.7 - Anti-tab hinge :

a) - Check the presence of the 2 hinge pin locking devices (trailing edge of tailplane, lower surface, at end of tab control surface).
b) - Lubricate adequately with oil (AIR 3511). Wipe off excess oil with a dry rag.

5.6.8 - Anti-tab control surface :

a) - Check state : impacts, cracks, paint finish, hinge play.
b) - Check trailing edge for straightness.

5.7 - Rudder

5.7.1 - Fuselage : inside cabin : rudder bar control

a) - Check state of rudder bar welds (the only way of checking the possible presence of cracks around the welds, is to use an Ardrox type process, when the rudders are disassembled).
b) - Check alignment of rudder bars.
c) - Check attachment of rudder bar bearings.
d) - Lubricate bearings with grease (AIR 4210 A).
e) - Check security of nose wheel steering interconnecting rods.

5.7.2 - Steering system adjustment (system disassembled i.e. : cables disconnected from rudder bars and rudder control surface - nose wheel interconnecting rod springs slack) :

a) - Connect up the cables on the rudder side. Set the tensioners to the intermediate position (no threads visible from the outside). Apply this procedure to the control surface LH and RH tensioners.
b) - Split pin the cable fitting pins.
c) - Routethe rudder control cables as follows :

- through the guiding fibre fittings, in the rear fuselage section,
- on the central fibre fitting, inside the fuselage (bottom panel),
- the left and right hand cables are crossed before routing on the 2 outside pulleys of the 4-pulley block.
- over the 2 pulleys located on a bracket, forward of the fuselage central box section (under seats),
- attachment to LH and RH rudder bars.

d) - Tilt the nose of the aircraft up, by pushing down on the rear fuselage section, to lock the nose wheel in the centralized position.
e) - Adjust the tension of the cables (see table), by screwing the nuts on the nose wheel interconnecting rods. The tension thus applied to the springs is communicated to the control cables.
f) - The rudder bars must be set to neutral, with regard to one another, and parallel with the firewall. Neutral adjustment can be effected without disturbing cable tensioning, by unscrewing (for example) the LH nut through x turns and screwing up the RH nut through the same number of turns.

The rudder is not central but :

1 - the rudder bars are in neutral and parallel with the firewall.
2 - after checking, cable tensioning is found correct (see table).
3 - the nose wheel is locked in the centralized position.

The solution consists in unlocking the rudder tensioners, then :

- unscrew the tensioner on one side through "n" turns and screw the opposite tensioner through the same number of turns, to centralize the rudder.
- lock the tensioners (safety pin or locking wire, according to makers).

5.7.3 - Nose wheel interconnecting rods :

a) - Check attachment to rudder bars.
b) - On the firewall (engine side), lubricate the rods or control bars and check the sealing devices.
c) - On the nose wheel, check the security of the ball and socket joints lock nuts.

5.7.4 - Front tunnel (centre of fuselage) :

a) - Rudder pulleys on forward box section : check bracket riveting and presence of pins preventing the cable from jumping out of the pulley groove.
b) - Check bends of rudder pulley bracket.
c) - Every 50 hours, lubricate the pulley spindles (grease AIR 4210 A).
d) - Check state of pulley grooves. If deeply marked by the cable, fit a new pulley.
e) - Check security of pulley spindles and, at re-assembly, ensure that the head of the bolts is facing up and the threaded portion facing down (Aeronautical Standard - Bureau Veritas).

5.7.5 - Fibre cable guides :

a) - Check security of rudder cables fibre guide on the bottom panel, inside the fuselage (rear). Check state of groove or cut-out, and of cable, where in contact. Burnishing of the cable length running over the fibre guide surface indicates the beginning of wear and necessitates the replacement of the cable and fibre guides affected.

5.7.6 - Cable exit through rear fuselage section :

a) - Check security of LH and RH fibre cable guides secured to the structure.
b) - Check riveting of cable exit fairings. Check shape : they might be distorted during a strongly nose-up landing and thus impede cable travel (for example, presence of stones on grass strips).

5.7.7 - Rudder cable tensioners and rudder bellcrank :

a) - Check locking of cable tensioners (use and adjustment of rear rudder tensioners : see § 5.7.2).
b) - Check attachment of fork end fitting pin and presence of split pin on castellated nut. Bolt head facing up, fork end fitting, washer, castellated nut, split pin.
c) - Check state of rudder bellcrank : cracks, protective finish, ovalization of securing holes.
d) - Check presence of bellcrank stop plates on fuselage sides : correctly aligned with bellcrank, rivets secure.

5.7.8 - Rudder hinge bolts and brackets :

a) - Check security and locking of rudder hinge bolts (head upward, thread downward).
b) - Check bolt brackets on control surface and fuselage : bends, riveting, corrosion.
c) - Check bolt clearance in bracket bores : if more than 0.3 mm greater than bolt diameter, change the bracket concerned.
d) - Replacement of hinge bolt brackets : to be carried out by Constructor only.

5.7.9 - Rudder electrical bonding :

a) - The control surface electrical bonding, or servicing of electrical and bonding circuits, are dealt with in Section 9 - Electrical system.

5.7.10 - Fairings :

a) - Check state of fairings : cracks, crazing.

In the case of superficial crazing, repair solutions are divided in 2 categories. It will be necessary to disassemble the fairing concerned, to assess the damage. Check whether the crazing is superficial (affecting the gel-coat) or deep (with damage to inner cloth layer).

1 - Superficial crazing of gel-coat and paint :

- Smooth out the crazed polyester and coat with the following products.
- Apply paint finish.

. White Mastic 2466 T : ROUTTAND, 133 Ave. Jean Jaurès
93300 Aubervilliers - France - Tel. : 352 - 17 - 97

or :

. SPRA Prester Mastic : Société Provençale de Résines Appliquées
30 - Sauveterre (Gard) - Tel. : (66) 89 - 21 - 94

These 2 compounds are recommended for polyester applications.

2 - Deep crazing :

- Outside surface : proceed as previously stated (1)
- Inside surface :

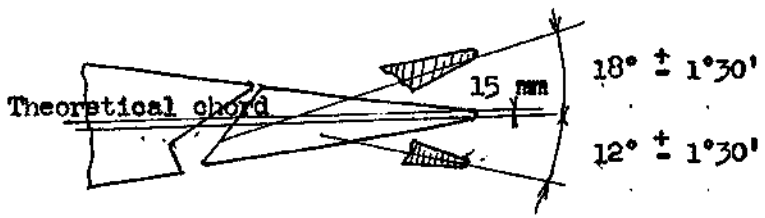
. Smooth over an area overlapping the affected zone by 50 mm (2") all round. On the inside surface, apply a patch of glass cloth (300 gr) or glass mat (300 gr) 50 mm (2") wider than the affected zone, using the following recommended resins :

1 - H 102 Ni-t, fire-proof Thorolite Tixothrope resin
2 - H 103 Ni-t, fire-proof - - - } supplied by Routtand

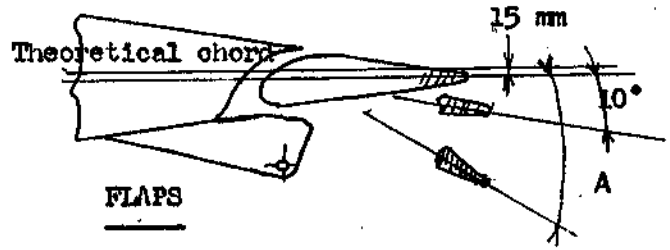
- The above resins are to be used when repairing engine cowlings (upper and lower, oil filling access panel) made of fire-proof resin materials.
- All other fairings can be repaired by means of the following normal types of resin :

  Resin H 67 (supplied by Routtand) or,
  Resin V 490 (supplied by Syntova - 21600 Longvic-les-Dijon - France.

CONTROL SURFACE MOVEMENTS



AILERONS

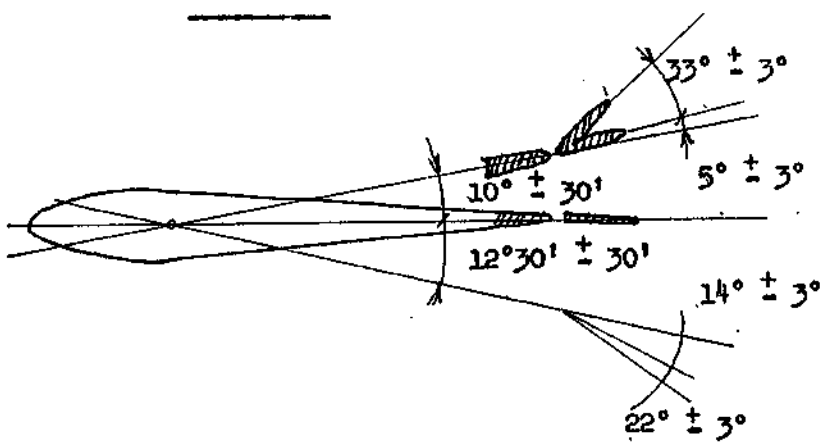


FLAPS

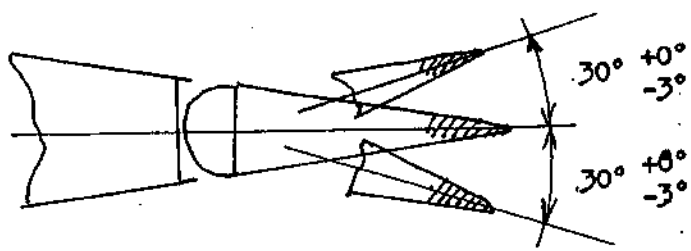
	HR 200/100 HR 200/120	HR 200 for U.K.	HR 200/100S HR 200/120B HR 200/160	
A	30°±2°30' or 20°±2°30'*	25°±2°30'	20±2°30'	

* If modification nr 17 applied.

TAILPLANE



RUDDER



CONTROL CABLES TENSION ADJUSTMENT

Tension in kg (lb)

	ELEVATOR	RUDDER	AILERONS
Min.	16 (35)	10 (22)	10 (22)
Max.	18 (40)	12 (26)	12 (26)

Under the effect of heat or cold, the cables will stretch or shrink. The ideal tension will depend upon these two factors. Adjustments will therefore be as follows :

a - In the Spring : with heat, the cables stretch. Tighten to maximum value so that, when the cables are stretched, the tension will be equal to, or greater than, the minimum value :

e.g. : Rudder : 26 lb

b - In Winter : with cold, the cables shrink. Loosen to minimum value :

e.g. : Rudder : 22 lb.

TIGHTENING TORQUES - BOLTS AND STRUCTURAL PARTS

- Wing :	
Wing spar - Front and rear attachment to fuselage	5.00 mkg (36 lb ft)
Tolerances : metric size ... : ± 10%	
inch size : ± 15%	
- Rudder :	
Upper rudder bearing attachment	0.30 mkg (2 lb ft)
Upper rudder hinge bolt	0.50 mkg (3.6 lb ft)
Lower rudder hinge bolt	0.50 mkg (3.6 lb ft)
- Tail plane :	
Balance weight bracket attachment	1.20 mkg (8.7 lb ft)
Balance weight attachment on support tube	0.30 mkg (2 lb ft)
Tail plane bearing attachment, on fuselage	0.30 mkg (2 lb ft)
Tail plane bearing attachment, on T/P spar	0.20 mkg (1.5 lb ft)
Tail plane hinge bolt	1.20 mkg (8.7 lb ft)
- Engine :	
Attachment of engine mountings	3 mkg (21 lb ft)
- Propeller :	
Attachment of propeller	4.5 mkg (32 lb ft)
(For HOFFMANN propellers : 1.8/1.9 mkg (13/14 lb.ft)	
- Ailerons	
Bolt at the end of the stick	0,8 mkg (5.7 lb.ft)

SECTION 6

LANDING GEARS - BRAKING SYSTEM

6.1 - Checks and adjustments

6.1.1 - Nose landing gear :

a) - Leg supporting frame verification : see chapter 3.4.5 - Structures.
b) - During the 50-hour periodical inspection, lubricate the nose wheel main pivot point, by means of the grease nipple provided on the central body of the leg supporting frame. Also lubricate the wheel looking system.
c) - Check the angular displacement of the nose wheel : $\pm$ 2° 30'

6.1.2 - Tyres :

The HR 200 aircraft is equipped with Dunlop Aero type tyres : size : 380 x 150.

a) - The tyre pressures, marked at the bottom of each wheel spat, must be checked periodically and more frequently if the aircraft is left standing for a long period of time.

Front wheel tyre pressure	: 1.6 bars (23 psi)
Main wheels tyre pressure	: 1.8 bars (26 psi)

b) - Check tyre wear. The treads must be visible. To land on a wet runway with smooth tyres can be dangerous : bad adherence, risks of bursting (thin tyres).
c) - When re-assembling the outer cover, take care not to pinch the inner tube (slightly inflate the inner tube).

6.1.3 - Leg and wheel fairing brackets :

6.1.3.1 - Wheel fairing bracket :

a) - Check state of bracket welds (Ardrox process for crack detection).
b) - At re-assembly, lightly lubricate the tube with grease, to facilitate subsequent disassembly.

6.1.3.2 - Leg fairing bracket : (not fitted on HR 200/100S)

a) - On landing gear :

1 - Check clamps for security on the fixed leg section.
2 - Check welds on tubes and bracket.

b) - Off landing gear :

1 - Fitting leg fairing bracket back in position :
- Locate the lower clamp at a distance of 1 to 1.2" from the shoulder of the fixed leg. Locate the upper clamp in position, temporarily.

- Fit the fairing bracket on the clamps.
- Align the bracket with the axis of the torque links, with the help of a plumb line or a rigid metal ruler.

6.1.4 - Inspection after hard landing :

a) - Remove the top and bottom engine cowlings.
b) - Inspect the front leg supporting frame. Ensure that there are no cracks on the welds, pivot point supporting tube. Check panels for distortion and security of supporting frame on firewall.
c) - Check alignment of front leg pivot point axis with fuselage axis, to detect a possible twist of the supporting frame.
d) - Remove the leg and wheel fairings from the main landing gears.
e) - Check the wing spar for cracks, separation, blisters around spar caps and ribs.

6.1.5 - Wheel and leg fairings : (not fitted on HR 200/100 S)

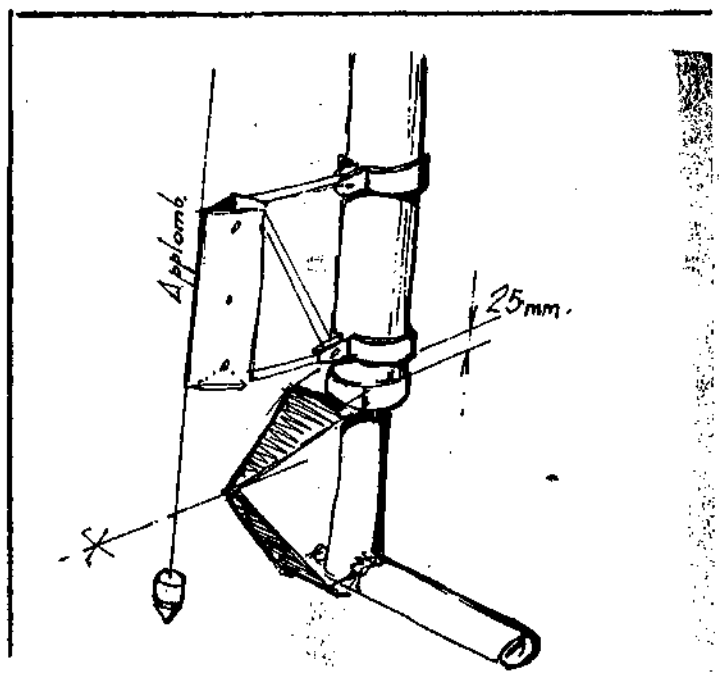
a) - Remove and clean the fairings with a solution of water + cleaning agent.
b) - Check state of fairings and repair defects (impact points, crazing, holes) using the methods described in § 5.7.10.
c) - At re-assembly, ensure that the lower surface of the wheel spats is parallel with the ground.

6.1.6 - Rotation of front landing gear :

a) - Check state of travel stops on the fixed leg section : welds, protective finish, cracks (Ardrox).
b) - Never rotate the nose wheel by means of the spat : use the towing bar located in the luggage compartment.

6.1.7 - Tightening of front leg pivot bolt :

a) - Unlock the bolt by removing the BTR screw which locks the securing nut.
b) - Check the torque load on the anti-friction washer (between 25 and 29 lb ft).
c) - Re-lock.



6.1.8 - Braking system :

- The brakes are controlled by means of pedals located above the rudder bar.
- The handbrake action locks the pressure within the braking system.
- Filling of the fluid reservoir is made easier by removing the panel located on the fuselage, forward of the canopy.
  When topping up, use "Brake Super Fluid BP" or equivalent

Brake pedals :

- Check the attachment of the brake pedals on the rudder bar. Tighten up sufficiently the bolts, ensuring that the pedals are free to move.
- Check the presence of the rod attachment washers and pins.

Brake inter-linking system :

- Check attachment of brake inter-linking rods : washer and pin.
- Check security of rudder bar bearing and inter-linking tubes on the structure.
- Check clearance of tubes in bearings. Max. clearance : 1.5 mm (0.06") on diameter.
- During disassembly, take care not to disturb the side stops on the inter-linking tubes as this would affect the alignment of the brake pedals.
- During re-assembly, if the brake pedals are not aligned, adjust by means of adjustable stops until comfortably positioned for the pilot (when the rudder is in neutral).
- Lubricate the inter-linking system bearings (oil AIR 3511), as well as all steering system pivot points.

Braking station and handbrake :

- Check for brake fluid leaks at master cylinders.
- If a master cylinder is leaking, replace it.
- Check state and operation of the handbrake plate.
- Check the master cylinder control fork end fittings for correct operation (the attachment pin must be free).
- Check the handbrake plate return springs for correct operation.
- Check attachment of handbrake slide control cable. Check also for possible excessive wear.

Brake fluid reservoir :

- Check fluid level. Top up to the mark provided on the side of the reservoir.
- Check pipe outlet connections on reservoir.
- Ensure that the Lockheed screw type connectors are secure on the base of the master cylinders (forward of firewall).

Piping :

- the brown sheath-covered pipes directly feed the braking unit of the RH and LH wheels.
- check their routing inside the fuselage tunnel, where they are crossed. Check for security and possible signs of wear through chaffing.
- check tightness and sealing of fuselage-to-wing pipe connectors located behind the rear seat back rest.
- after removal of gaiters and leg fairings, check the flexible hoses and their connectors.

6.2 - Maintenance of A.P.R. type landing gears

6.2.1 - Periodical checks :

- 50 hours : landing gear attitude
- 100 hours : verification of leg, wheel, brake unit and locking system.
- Major Inspection : oleo-leg draining - Exchange of standard parts, when required.

6.2.2 - Periodical maintenance operations :

6.2.2.1 - Landing gear attitude :

- On both main landing gear legs, ensure that the oleo leg is depressed through approximately 2/3 to 3/4 of its maximum stroke.
- On the nose landing gear, ensure that the oleo leg is depressed through approximately 1/2 to 2/3 of its maximum stroke.

If an oleo leg appears to be deflated, re-pressurize as described in § 6.2.3.1.2.
If this operation does not provide the expected result, the oleo leg fluid content might be incorrect.
Fluid level check : see § 6.2.3.1.1.

6.2.2.2 - Leg inspection :

- First, place the aircraft on jacks and remove the wheel.
- Make sure that the oleo leg is not leaking : the presence of a slight seepage does not necessitate the immediate grounding of the aircraft but requires a particular watch of the oleo leg concerned and the factory replacement of the defective seal at the next inspection due.
- Check the surface finish of the rod chromed section : roughness must be less than 3.2 L.C.A. If greater, change the sliding rod.
- Check torque link play. The amount of play present must not allow a displacement greater than 1.5 mm (plus or minus), when measured at the tip of the wheel axle. If greater, change the torque link bushes and shafts, as described in § 6.2.3.2.1.

- Check the presence of the HP cap on the inflating valve. Since it is the only means to seal the oleo leg, its presence is essential.

6.2.2.3 - Wheel inspection :

- Ensure that the wheel rims are not damaged. If damaged, replace the element concerned.
- Ensure the presence of the bearing sealing flanges : if a flange is missing, the bearing must be replaced as described in § 6.2.3.3.1.
- Check state of wheel stop retaining pin : if signs of shearing are detected, replace the pin by a new item.

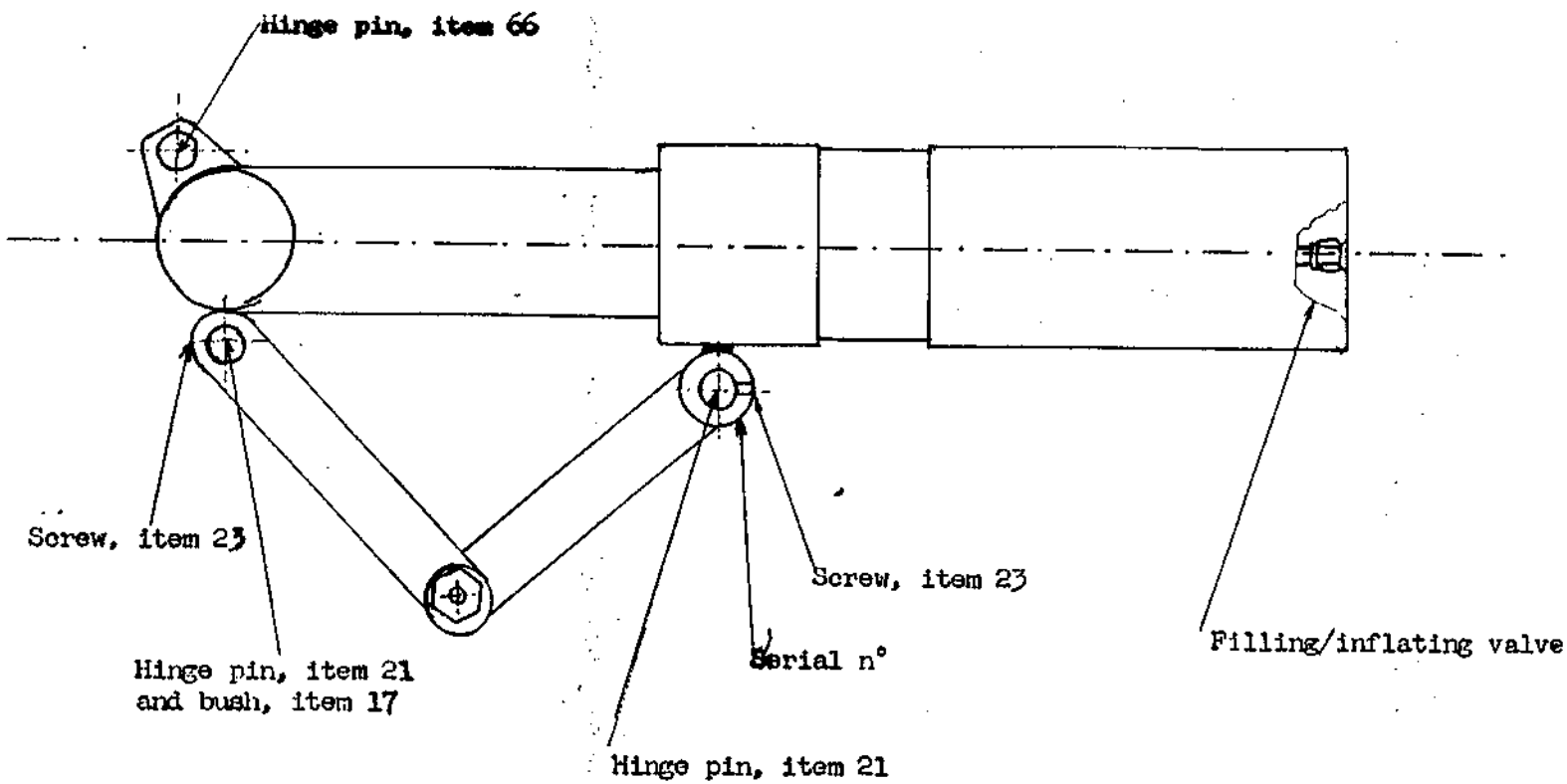
6.2.2.4 - Brake drum inspection :

- Check play between brake shoe lining and drum liner.
- Check state of springs.
- Check security of wheel cylinder on its bracket.
- Check security and position of adjusting cams, to obtain a clearance of 0.2 mm between the shoe lining and drum liner.

6.2.2.5 - Inspection of nose wheel locking system :

- With the nose wheel leg extended, ensure that the locking control rod is not bent. If bent, replace as described in § 6.2.3.5.1.
- Check clearance between rod ramp and locking roller : must be equal to 0.1 to 0.2 mm. If not, adjust as described in § 6.2.3.5.2.
- Lubricate the rod, look, roller and cam assembly, with neutral grease.

OLEO-LEG PRINCIPLE



6.2.3 - Repairs

6.2.3.1 - Oleo-leg :

6.2.3.1.1 - Fluid level checks :

This operation is carried out with the aircraft resting on its wheels, or jacked up.

- Release the oleo-leg pressure.
- Remove the valve core with a Schraeder tool (28651 or 28664).
- On the valve, connect up the outlet pipe of an oil pump equipped with a decompressor (or return line to reservoir).
- Inject the hydraulic fluid (AIR 3520) in the oleo-leg until the leg is completely extended.
- When the leg is completely extended, open the pump return line.
- Compress the leg fully (under the aircraft weight or by pushing the sliding rod).
- Disconnect the pipe and fit the valve core in position.

6.2.3.1.2 - Inflating :

This operation is carried out with the aircraft jacked up, leg fully extended.

- Connect up the pressure supply pipe (air or nitrogen) by means of a standard fitting (Schrader tool 30908 or 28649).
- Inflate to the required pressure (Po): { Main landing gear : 8 bars (114 psi) / Front landing gear : 3 bars (48 psi) }
- Disconnect the supply pipe.
- If this operation has been preceded by a removal of the valve core, check sealing with soapy water.
- Fit and hand tighten the HP cap. Its presence is essential. It must be hand tightened only : no spanner.

6.2.3.2 - Torque links :

6.2.3.2.1 - Replacement of torque link pins and bushes :

This operation is carried out with the aircraft jacked up and wheel removed.

- Loosen the pin retaining screws (item 23) with a 2.6 or 3 mm Allen key (according to type). If a screw is hard to release, heat the surrounding area to 80 - 100°C
- With a drift, push out the hinge pins (item 21).
- Extract the worn bushes (item 17), lubricate with grease and fit the new bushes.
- Fit the new hinge pins in the bore of the torque link attachment : it must be a drive fit. If necessary, ream out the bore. In the case of a free fit, carry out the operation described in § 6.2.3.2.2.
- Lubricate with neutral grease and fit the torque link and pin on the leg.
- Secure the hinge pins with the locking screws. Lock the latter with a drop of Loctite compound for fine threads.

6.2.3.2.2 - Fitting of oversized torque link hinge pin :

If the new hinge pin is a free fit in its housing, it will be necessary to fit an oversized pin. The diameter of the oversized pin is 0.2 mm larger than that of a normal pin. Consequently, the bore of its housing must be reamed until a drive fit is obtained. The torque link bushes must also be reamed out to obtain a sliding fit.

6.2.3.3 - Wheels :

6.2.3.3.1 - Replacement of bearing :

The removal of the worn bearing can be a delicate operation. To remove the bearing, a press should be used whenever possible, after thorough cleaning of the zone affected. When the worn bearing is removed, make sure that the bore of the housing has not been damaged and that it remains within the tolerances of the 80 mm dia. M6 fit (- 0.008 to - 0.028 mm).

To fit the new bearing, first heat the wheel hub to 105°C (max.) for 1 hour in a hot oil bath or cool the bearing in liquid nitrogen.

6.2.3.4 - Drum type brakes :

Replacement of brake shoes (wheel removed) :

- Release the lower spring.
- Disengage the shoes from the upper fixed hinge point, complete with their springs.
- Engage the new shoes, with the upper spring.
- Fit the lower spring.

6.2.3.5 - Front landing gear locking system :

6.2.3.5.1 - Replacement of control rod :

- This operation is carried out with the nose leg extended.

  . Loosen the two M8 nuts securing the lower end of the rod to the axle.
  . Slide the rod upwards and fit the new rod in position.

6.2.3.5.2 - Adjustment of control rod :

With the leg fully extended, the ramp secured to the top end of the rod must be brought into contact with the lock roller, the tip of the lock being engaged in the recess of the locking cam.

When the control rod nuts are locked, there must be a gap of 0.1 to 0.2 mm between the ramp and the roller.

Copiously lubricate the rod, the lock roller and the lock itself, with grease.

6.3 - Maintenance of S.A.B. type landing gears

6.3.1 - Lubrication :

Every 100 hours, or six months, lubricate the torque link pins with AIR 4215 A grease (or better still : AIR 4206 A) (4 grease nipples per leg). In addition, on the nose landing gear, lubricate the pivot point, the locking device and its cam.

6.3.2 - Oleo-leg inflating :

Re-inflate the oleo-legs when, with the aircraft on the ground, the remaining stroke drops below 50 mm (2") (this stroke might be greater, particularly at the front, according to loading : it is measured between the top of the wheel spat and the mark provided on the fixed fairing).

With the oleo-legs extended, the pressures are : 4 bars (58 psi) at the rear and 3.5 bars (51 psi) at the front. Lift the aircraft so that the wheel is off the ground. Use AIR only. The inflating valves are of the automotive HP type. Tighten the blanking caps fully (by hand + 1/2 turn with a pair of pliers).

In case of leakage, change the valve core and the cap : ensure that the end of the valve body is perfectly smooth.

If in doubt with regard to the hydraulic fluid level, top up before inflating.

Do not try to check the pressure inside the oleo-leg without inflating it : since the internal volume of air is very small, the indication given has no value, whatever the type of pressure gauge used might be.

6.3.3 - Oleo-leg filling (or level checking) :

Hydraulic fluid used : AIR 3520.

Lift the wheel clear of the ground and release the oleo-leg pressure by slightly unscrewing the valve core (to avoid splashes). When the pressure is exhausted, remove the valve core.

Force fit a polyvinyl tube onto the valve (15" long). Compress the leg fully and dip the free end of the tube into a can of hydraulic fluid, then slowly extend the leg fully : repeat this procedure 3 or 4 times until no more air bubbles are seen flowing through the plastic tube.

Make sure that the free end of the plastic tube remains inside the hydraulic fluid. Complete the operation by compressing the leg gently to within 10 cm (3") of its maximum stroke (as measured on the hole provided for that purpose on the fixed fairing). First ensure that this hole corresponds accurately to the end of the stroke. Disconnect the plastic tube.

Fit the valve core back in position.

SECTION 7

ENGINE

1 - Inspection and maintenance

1) - Daily pre-flight checks :

a) - Ensure that all switches are OFF
b) - Ensure that the magnetos are earthed
c) - Check engine oil level
d) - Ensure that fuel tanks are full
e) - Check all fuel and oil pipe connectors
Check the minor repairs carried out during the 50-hour inspection
Rectify all large leakages before flight
f) - Open the fuel system drain cocks to eliminate accumulated water or sediments
g) - Ensure that all baffles and cowlings are in position and secure. If missing or damaged, replace or repair before flight
h) - Check the controls : state, stroke, freedom of movement
i) - Check the air filter, service as laid down in this document

2) - 25-hour inspection :

After the first 25 hours of operation, the engines (new, reconditioned or overhauled) are subjected to an inspection equivalent to the 50-hour inspection (oil change included).

3) - 50-hour inspection :

In addition to the normal daily pre-flight checks, carry out the following inspection operations every 50 hours :

a) - Ignition system : Remove, clean and check the sparking plugs. Adjust the gaps. Fit new plugs if necessary.
Check state of ignition leads and ceramic insulators.
The presence of corrosion or deposits indicates that the sparking plug is not sealed, the sparking plug sides are dirty, or the connector is clogged up.
In such a case, clean the connector and the sparking plug sides and ceramic insulator, with a clean dry rag (or with a rag dipped in M.E.K. - Dry the parts thoroughly before refitting).

Check the ignition harness : state, security of clamps. Ensure that the connectors (on magnetos and sparking plugs) are tight.

b) - Fuel and air intake systems : check priming lines for leaks and security of clamps. Drain the carburetor and clean the fuel filter. Check throttle and mixture controls : travel, high spots, security of clamps. Lubricate if necessary. Check the air intake duct for damage, leaks, security, presence of foreign bodies (indicating that the air intake filter is defective or incorrectly serviced). Check venting lines : in case of evident fuel or oil leaks, it might be necessary to change the fuel pump.

c) - Lubrication system : check pipes for leakage (particularly from the connectors), security, signs of wear (chaffing or vibration), cracks or traces of impacts.

Drain the crankcase and refill with fresh oil. See last issue of Service Instruction n° 1014, indicating the types of approved oils.

d) - Exhaust system : check for leaks, between cylinders and exhaust pipes. If the latter are found to be loose, remove them and machine the mating flanges flat. Check general state of exhaust manifolds.

e) - Cooling system : ensure that the cowlings are in good condition and securely attached. If a component of the cooling system is missing or damaged, fit it back in position or change it before using the aircraft again.

f) - Cylinders : check for oil leakage at rocker box cover joints. In case of leak, fit new gaskets and tighten the screws correctly (50 in lb).
Ensure that the cylinders show no signs of excessive heating (burnt paint). If such signs are detected, it indicates that the cylinder affected is internally damaged. Find the cause of such damage and cure it before using the aircraft again.

4) - 100-hour inspection :

In addition to the daily pre-flight checks and 50-hour inspection operations, carry out the following inspection operations every 100 hours :

a) - Electrical system : check all cables connected to the engine or its accessories. Damaged shielded cables must be replaced. Also replace all defective clamps or wires in bad condition. Ensure that all connecting terminals are clean and secure.

b) - Magnetos : Check c/b points. Make sure that there is no excessive amount of oil in the c/b casing. If an excessive amount of oil is found, wipe it with a fluff-free, clean rag. Lubricate the wicks in accordance with the magneto manufacturer's instructions.
Check mag. timing (see Chapter 2 - Engine section).

c) - Engine accessories : check engine accessories (pumps, temperature probes, pressure probes) for security of attachments, connections and terminals.

d) - Cylinders : visually check for cracked or broken cooling fins.

e) - Engine attachment points : check securing bolts and bushes (security, excessive wear). Replace any excessively worn bushes.

f) - Priming nozzles : disconnect the engine priming nozzles and ensure that the fuel flow is identical from each nozzle.

g) - Push-rods : check clearance.

5) - 400-hour inspection :

In addition to the daily pre-flight checks, 50-hour and 100-hour inspection operations, carry out the following operations every 400 hours :

a) - Valve check : remove the rocker box covers and ensure that a clearance is present between the rockers and the valves, when the latter are closed. Check push-rod tips, cups, springs and spring seats, for excessive wear or damage. If such signs are detected, change the cylinder and all its components, including the piston and con-rod : make sure that no other component is damaged. Change all parts out of tolerances (see last issue of Special Service Note n° SSP 2070).

2 - Maintenance procedures

The instructions contained in this Chapter are provided to guide and train the maintenance staff called upon to carry out the periodical inspections described in the previous Chapter. No attempt has been made to include repair or exchange operations : these will be found in the appropriate Avco Lycoming Overhaul Manual.

1) - Electrical and ignition system

a) - Replacement of ignition harness or of an ignition lead : if it becomes necessary to change the ignition harness complete, or a single ignition wire, refer to the wiring diagram to ensure correct re-connection. Before removal, mark the position of cleats and clamps to ensure that the new item will be correctly positioned.

b) - Magneto timing : although several types of magnetos can be used on this type of engine, the timing procedure described hereunder is valid for all magnetos.

NOTE : The magneto equipped with a pulse type coupler (or delayed c/b when applicable) is fitted on the LH side of the engine.

1.1 - Remove a sparking plug from cylinder n°1 and place the thumb over the sparking plug hole. Turn the engine over by hand in the normal direction of rotation until the compression stroke is reached (the pressure inside the cylinder tends to push the thumb away). Continue to turn the engine in the same direction until the "advance" mark on the front face of the crown wheel is exactly in front of the small orifice provided at the 2 o/c position on the front face of the starter casing. This marking is located at 18° on engine types 0.290 D2 and D2A (25° BTC on other types*). The engine is now ready to receive the magneto.

* 20° BTC on O-235-L2A engines

All timing operations, except advance setting on cylinder n°1, are identical for all magnetos.

The timing of SLICK type magnetos is described in the following paragraphs. The procedure applicable to BENDIX magnetos is given after.

Magneto equipped with pulse coupler : place the spring of lead T1 or B1 1.6 to 3.2 mm (0.06 to 0.125") from the magneto casing and rotate the pulse coupler one step at the time until a strong spark jumps between the spring and the case. Hold the magneto firmly to prevent the coupler from moving off the position where the spark occurred. Reverse the direction of rotation and rotate the magneto through approximately 25° or 20° until the orifice of the timing rod appears in the centre of the venting plug orifice. Lock the rotor with the timing rod and bring the latter in the centre of the venting plug orifice.

Ordinary magneto : hold the spring of lead B1 at a distance of 3.2 mm (0.125") from the casing. Rotate the rotor quickly anti-clockwise, until a strong spark jumps between the wire and the casing. Turn the rotor in the opposite direction until the orifice of the timing pin appears in the centre of the venting plug hole : insert the rod in this hole.

NOTA : If the engine is accidentally turned in the direction opposite to that of its normal rotation, all the above operations must be carried out again because the accumulation of backlash would make the final setting incorrect.

1.2 - Remove the inspection covers of both magnetos and rotate their drive shaft in the normal direction of rotation until the first painted tooth of the distributor gear is located in the centre of the inspection hole. Taking care not to disturb this setting, fit the seals and the magnetos in position on the engine. Fit the washers and the nuts (finger tight).

NOTA : To rotate the drive shaft of a magneto fitted with a pulse coupler, press the pawl of the coupler with one finger.

1.3 - Carry out the following adjustment with the help of a lamp and battery set : connect the + lead of the set to an appropriate point connected to the earthing terminal of the magneto, and the - lead to any unpainted part of the engine. Rotate the magneto on its securing studs until the light of the test set comes ON then, slowly move the magneto back in the opposite direction until the light goes OFF. Then slowly move the magneto in the first direction of rotation until the lamp just lights up. Repeat this procedure with the other magneto.

NOTE : AC type test sets work opposite to the lamp and battery set described above : consequently, the lamp goes OFF when the c/b points open.

1.4 - When both magnetos are set, carry out the following check to ensure that they fire simultaneously :

1.5 - Rotate the engine in the direction opposite to that of its normal rotation : the lamps of the test sets must go OFF. Turn slowly the engine back in its normal direction of rotation until the setting mark appears through the orifice provided on the starter casing. At that moment, both lamps must come ON simultaneously. Tighten the magneto securing nuts to the required torque.

c) - Generator or alternator output : check the generator, or the alternator, as applicable, to ensure that the specified voltage and current are obtained.

2) - Fuel system

a) - Curing of leaks : when replacing a fuel pipe or an accessory of the fuel system, use only fuel-soluble lubricant (clean engine oil) on the threads. It is forbidden to use any other lubrication products.

b) - Carburetor inlet filter : remove the filter and ensure that its element is not distorted or holed, otherwise change it. Clean with solvent and dry with compressed air. At re-assembly, fit a seal on the filter and insert this assembly in the carburetor body : torque loading : 35 to 40 in lb.

c) - Fuel : quality and limitations : the aviation fuel grades recommended for this engine are indicated in this Manual. If the correct grade of fuel is not available on certain airfields, it is permitted to use a fuel of higher octane rating. Do not use a fuel with an octane rating lower than that specified. It is forbidden to use road vehicle type fuels, whatever the octane rating might be.

NOTE : These engines are equipped with solid stem type valves : consequently, the use of a fuel with an octane rating higher than that specified must be limited in time. It is recommended that the personnel should familiarize itself with the content of Service Instruction n° 1070, concerning the fuel specified for Avco Lycoming engines.

d) - Air intake filter and ducts: ensure that the air intake ducts are not obstructed and do not contain any foreign bodies. Check and service the air filter.

e) - Idling speed and mixture adjustments :

1 - Start and warm up the engine in the normal manner until normal oil and cylinder temperatures are reached.
2 - Check magneto operation ; if the rev drop check is satisfactory, adjust the idling speed.
3 - Adjust the throttle control screw so that the engine runs at the idling speed recommended by the aircraft Constructor. If this speed is substantially altered after mixture adjustment, it will be necessary to re-adjust it.
4 - When the idling speed is stable, pull the mixture control slowly towards the "cut-off" position, while watching the rev counter to see if the speed alters during the leaning operation. Bring the control back to the "full rich" position before reaching the point where the engine stops. An increase of more than 50 rpm during the leaning operation indicates that the idling mixture is excessively rich. On the other hand, an immediate drop of speed (if not preceded by a temporary increase) indicates that the mixture is too lean.

In each of these two cases, turn the mixture control screw in the appropriate direction to correct the mixture. Repeat the above operations to check the setting. Re-adjust until the speed increases temporarily by approximately 50 rpm. Every time the setting is modified, rev up to 2000 rpm to clean the engine before checking the idling speed. Make final adjustment with the slow running screw to obtain the desired number of rpm when the throttle is in the idling position.

This method provides a setting giving maximum speed for a minimum boost pressure. If the setting is unstable, check the slow running linkage : any play in this linkage will lead to irregular idling speed. In all cases, it will be necessary to take into account the effects which the atmospheric conditions and altitude of the location might have on the idling speed adjustment.

3) - Lubrication system

a) - Lubricating oil : quality and limitations : refill the system with the recommended grade of oil.

b) - Crankcase capacity : 6 quarts
2 quarts = minimum quantity for safety.

c) - Relief valve : the engines covered by this Manual are equipped either with an adjustable relief valve, or a pre-set, non adjustable relief valve, fitted on the RH half crankcase, behind cylinder n°3. The adjustable relief valve is used to maintain the oil pressure within the specified tolerances (when the adjusting screw is moved clockwise, the pressure is increased, when moved anti-clockwise, the pressure is reduced). Setting of the non-adjustable relief valve is obtained by means of 3 STD 425 washers (maxi.) located under the cap (pressure increased), or by means of a thickness shim P/N 73629 or 73630 (pressure reduced).

4) - Tension of generator drive belt

- Check the tension of a new belt, 25 hours after assembly. See Service Instruction n° 1129 and Service letter n° L 180, which indicate the procedures to be used when checking the tension of the generator drive belt.

7.1 - Spinner

a) - Check spinner attachment on back plates.
b) - Check state of spinner around securing screw holes : cracks.
Where the cracks do not exceed 5 mm (0.2") in length, as measured from the outside of the whole, the adequate solution consists in drilling a 2 mm dia. (0.08") hole at the end of the crack.
For larger cracks, the only repair possible before replacement of the spinner, consists in riveting a light alloy reinforcing plate over the area affected. Such a repair necessitates re-balancing of the propeller-spinner assembly. An ideal solution would be to fit an identical plate, diametrically opposed to the first one.

7.2 - Engine cooling baffles

a) - Check general condition of the baffles : cracks, wear, rubbing, distortion, protective finish.

It is strongly recommended to remove all baffles every 100 flying hours and to thoroughly inspect each one. Any crack with a length equal to, or less than 10 mm (0.4") can be stopped by drilling a 2 or 3 mm (0.08 to 0.10") dia. hole at the end of the crack.
If the crack, or split, is larger than above, fit a new baffle.

b) - Check state of upper rubber strips, specially around the rivets securing them to the baffles.

7.3 - Exhaust pipes and manifolds

a) - Check security of exhaust pipe flanges. Normal tightening is sufficient since there is a floating connector provided between the flange (on the engine) and the manifold.

b) - Check the exhaust pipes round the floating connector : presence of lock nut on securing screw, condition of welds (lugs).

c) - With the bottom engine cowling in position, make sure that the clearance between the exhaust pipes and the polyester material is adequate.

d) - Check security of cabin heater shield fitted on the exhaust manifold, as well as the welding of the distributor ducts.

7.4 - Sparking plugs

a) - Check routing of ignition harnesses, from magnetos, through supporting cleats, and to sparking plugs.

b) - Check state of the ignition harnesses in the vicinity of the exhaust pipes : state of leads.

c) - Harness replacement : refer to Engine Manufacturer's Parts Catalog.

* HR 200 aircraft equipped with engine type : Lycoming 100/108 - 0235 J 2A :
Sparking plugs fitted : AC, type SR 86.

7.5 - Magnetos

a) - Timing : refer to Operator's Manual applicable to the engine fitted on the aircraft.

7.6 - Lubrication system (engine side)

The engine oil filter is cleaned at intervals well defined in the engine manufacturer's Operator's Manual.

However, the intervals between oil changes can be increased from 20 to 30 hours, according to local humidity conditions and state of engine, and depending on the frequency of flights and whether or not correct maintenance is carried out.

a) - Rear engine flange : check the security of the oil temperature pressure switch and attachment of electrical cables.

b) - Firewall front face : check the security of the oil pressure pressure switch and the attachment of engine piping.
Check presence of the lock which prevents the pressure switch from falling out of its clamp.

c) - Check security and locking of the pipe supporting the oil dipstick.

d) - Front engine section, LH front baffle :
- check connection of oil breather flexible hose.
- check routing of oil breather pipe and passage through rubber grommet fitted on the baffle (grommet in position on baffle wall).

e) - Lower engine section : check passage of oil breather pipe in front of cylinders and inside engine bearer frame (attachment with Nylon straps).

f) - Attachment of oil breather pipe on LH side of firewall : check clamp tightness.

g) - Check attachment of oil cooler (RH side of firewall).

h) - Check oil pipe connector seals, particularly on the rear engine flange : supply and return pipes from engine to cooler. In this zone, oil leaks can be seen only when the engine is running : in certain cases they only appear at high engine speed. Consequently, it is advisable to carry out, at the 50-hour inspection for example, an engine ground run with all cowlings removed and to minutely inspect all the lubrication system (one operator at the aircraft controls and another one near the engine).

7.7 - Lubrication system (cabin instruments)

a) - RH side of instrument panel, pilot's seat : 1 Jaeger combined oil pressure/temperature indicator.

Engine : Lycoming 0235 H2C - 0235 C2C - 0235 J2A - 0.235.L2A - 0-320-D		
Oil pressure :	min. idling (red)	24 psi
	normal (green)	60 to 89 psi
	max. (starting/warming) (red)	100 psi
Oil temp. :	min. and normal (green)	40°C
	max. (red)	118°C

b) - Check these parameters, inside the aircraft, with the engine running.

o) - Check engine oil level : max. 6 quarts : min. 2 quarts : For O-320-D - max : 8 qts - min : 2 qts

7.8 - Engine controls (cabin side)

Inside cabin - Instrument panel - Front tunnel console

a) - Aircraft on the ground, engine stopped, controls free : actuate the engine controls and check for play or stiffness. During this check, ensure that nothing impedes the correct operation of :

- the throttle control,
- the mixture control,
- the carb. heater control.

This inspection can be more thorough if, with the engine cowlings removed, an assistant checks, at the same time, the movements of the engine controls on the engine itself.

b) - Lubricate all controls with grease (AIR 4210 A).

c) - Check security of conduit ends : locking of pins.

d) - Check routing of all engine controls :

1 - Front face of instrument panel and firewall : no contact with electrical cables or with other controls.
2 - Firewall (engine side) : sealing (with America type compound).
3 - Engine : routing through engine bearer frame : attachment with Nylon straps on frame tubes. During 50-hour inspection, check strength of straps by actuating the control : the latter must remain firmly in position, with no vibrations.
4 - Attachments : check locking of control attachments on the carburetor.

e) - Electrical circuit-breaker on engine bearer frame : check for security and state of earthing braid.

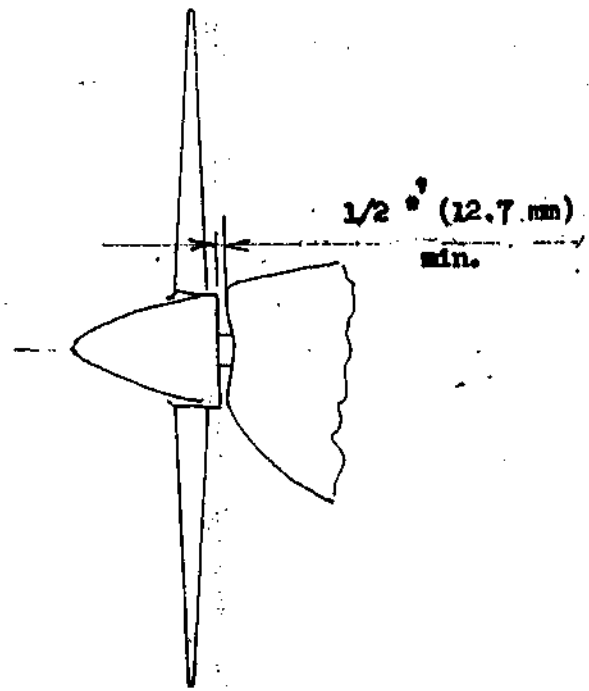
7.9 - Engine cowlings and oil filling access door

a) - Check state of polyester engine cowlings and access door to oil filler. These elements are made of fire-proof resin material. For repairs, refer to § 5.7.10 in the Flight Controls - Structures Section.

b) - Check attachment of cowlings and door fasteners (Dzus, Camloc).

c) - When fitting a new (or standard exchange) cowling, respect the clearance (min.) between the cowling and propeller spinner, which must be equal to, or greater than 1/2" (12.7 mm). This rule is the object of an aeronautical standard concerning the clearance required in front of any moving or rotating body fitted on the aircraft.

HR 200/100S is equipped with a little spinner.



7.10 - Approved propellers :

HR 200/100 S	AIRCRAFT	HR 200/100	HR 200/120	HR 200/120 B.		HR 200/160
HOFFMANN	Manufacturer	MAC CAULEY	MAC CAULEY	MAC-CAULEY	HOFFMANN	SENSENICH
HO 14/178-115	Type	1A 105/BCM-7056	1A 135/JCM-7154	1A 135/JCM 71.47	HO-14/178-115	74DM 6S5 -2-66
1.78 m	Diameter	70 inches	71 inches	71 inches	1.78 m	72 "
1.15 m	Pitch	56 inches	54 inches	47 inches	1.15 m	66"
1.73 m	Minimum repair diameter	67 inches	70 inches	70 inches	1.73 m	72"
2600 RPM	Maximum RPM	2600	2800	2800 RPM	2800 RPM	2700 RPM
13/14 ft.lbs	Retaining bolt torque	32 ft.lbs	32 ft.lbs	32 ft.lbs	13/14 ft.lbs	32 ft.lbs

7.11 - Trouble-shooting :

General : Experience has proven the best method of "trouble-shooting" is to decide on the various possible causes of a given trouble and then to eliminate these causes one by one, beginning with the most probable. The following chart lists some of the more common engine troubles usually found in maintaining aircraft engines.

TROUBLE	CAUSE	REMEDY
Failure of engine to start	Lack of fuel	Check fuel system for leaks. Fill fuel tank. Clean dirty lines, strainers or fuel cocks.
	Underpriming	Prime with engine priming system.
	Overpriming	Open throttle and "unload" engine.
	Incorrect throttle setting	Set at 1/4 open position.
	Defective spark plugs	Clean and adjust or replace spark plug or plugs.
	Defective battery	Replace with charged battery.
	Improper operation of magneto breaker points	Clean points. Check internal timing of magnetos.
	Water in carburetor	Drain carburetor and fuel lines.
	Internal failure	Check oil sump strainer for metal particles. If found, complete overhaul of engine is indicated.
Failure of engine to idle properly	Incorrect carburetor idle adjustment.	Adjust throttle stop to obtain correct idle.
	Idle mixture	Adjust mixture.
	Leak in the induction system	Tighten all connections in induction system. Replace any parts that are defective.
	Low cylinder compression	Check condition of piston rings and valve seats.
	Insufficient spark	Check entire ignition system.

TROUBLE	CAUSE	REMEDY
Low power and uneven running	Mixture too rich ; indicated by sluggish engine operation, red exhaust flame at night. Extreme cases indicated by black smoke from exhaust.	Check primer shut-off valve for leakage. Readjustment of carburetor by authorized personnel is indicated.
	Mixture too lean ; indicated by overheating or back-firing.	Check fuel lines and filters for dirt or other restrictions. Readjustment of carburetor is indicated.
	Leaks in induction system.	Tighten all connections. Replace defective parts.
	Defective spark plugs	Clean or replace spark plugs.
	Poor fuel	Fill tank with fuel of recommended grade.
	Magneto breaker points not working properly	Clean points. Check internal timing of magnetos.
	Defective ignition wire	Check wire with electric tester. Replace any defective wire.
	Improper ignition timing	Check magnetos for timing and synchronization.
	Defective spark plug terminal connectors	Replace connectors on spark plug wire.
	Incorrect valve clearance	Adjust valve clearance.
Failure of engine to develop full power	Throttle lever out of adjustment	Adjust throttle lever.
	Leak in the induction system	Tighten all connections, and replace defective parts.
	Restriction in carburetor air scoop	Examine air scoop and remove restrictions. Clean air filter.
	Improper fuel	Fill tank with recommended fuel.
	Faulty ignition	Tighten all connections. Check system with tester. Check ignition timing.

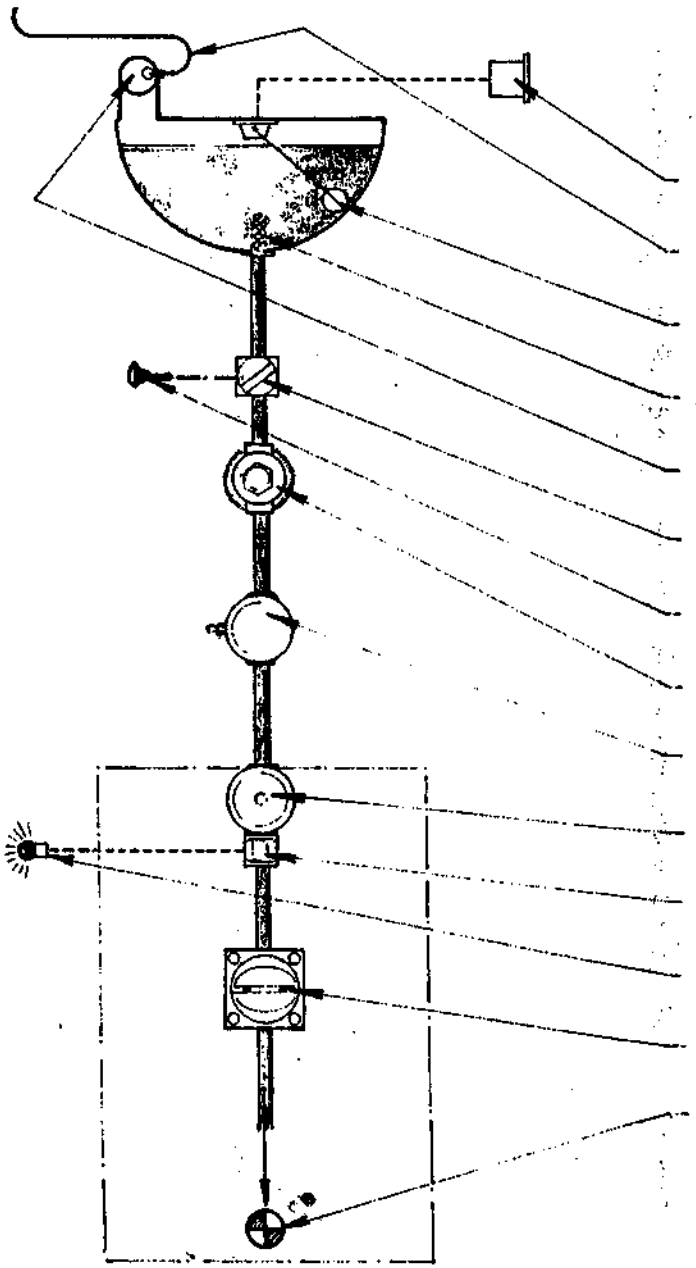
TROUBLE	CAUSE	REMEDY
Rough engine	Cracked engine mount	Replace mount.
	Unbalanced propeller	Remove propeller and have it checked for balance.
	Defective mounting bushings	Install new mounting bushings.
	Malfunctioning engine	Check entire engine.
Low oil pressure	Insufficient oil	Fill sump to proper level with oil of recommended grade.
	Air lock or dirt in relief valve	Remove and clean oil pressure relief valve.
	Leak in suction line or pressure line	Check gasket between accessory housing and crankcase.
	Dirty oil strainers	Remove and clean oil strainers.
	High oil temperature	See "High oil temperature" in "trouble" column.
	Defective pressure gage	Replace gage.
	Stoppage in oil pump intake paggage	Check line for obstruction. Clean suction strainer.
High oil temperature	Insufficient air cooling	Check air inlet and oulet for deformation or obstruction.
	Insufficient oil supply	Fill oil sump to proper level with oil of recommended grade.
	Low grade of oil	Replace with oil conforming to specification.
	Clogged oil lines or strainers	Remove and clean oil strainers.
	Excessive blow-by	Usually caused by worn or stuck rings. Complete overhaul required.
	Failing or failed bearing	Examine sump for metal particles. If found, complete overhaul of engine is indicated.
	Defective temperature gage	Replace gage.

TROUBLE	CAUSE	REMEDY
Excessive oil consumption	Low grade of oil	Fill tank with oil conforming to specification.
	Failing or failed bearing	Check sump for metal particles.
	Worn piston rings	Install new rings.
	Incorrect installation of piston rings	Install new rings.
Cold weather difficulties	Cold oil	Move aircraft into a heated hangar. Heat oil.
	Inaccurate pressure readings	In extreme cold weather, oil pressure readings up to approximately 100 pounds do not necessarily indicate malfunctioning.
	Weak battery	Install fully charged battery.
	Overpriming	Leave throttle open and ignition "off". Put mixture control in "Idle cut-off" and crank until engine starts. Immediately return to "full rich" mixture.
Engine does not stop	Linkage does not permit full travel of "Idle cut-off"	Readjust linkage for full travel.
	Leaking "Idle cut-off"	Overhaul carburetor.
	Faulty ignition switch	Check ground wires, overhaul switch.

SECTION 8

FUEL SYSTEM

FUEL SYSTEM DIAGRAM



1 Fuel content gauge
2 Venting pipe
3 Level gauge
4 Tank filter
5 Filler cap and vent
6 2-way selector cock
7 Selector cock control (mechanical)
8 Decanting filter
9 Electrical pump (emergency)
10 Mechanical pump (engine)
11 Fuel pressure switch
12 Yellow warning light (instrument panel)
13 Carburetor
14 Engine cylinders

UTILIZATION

- The HR 200 Aircraft is equipped with a fuel tank of 25 Imp gal capacity (118 l).

- The fuel supply is controlled by a 2-position selector cock : "OPEN" - "CLOSED".
- The electrical fuel pump is controlled from the central console, by means of a 2-position switch : "ON - OFF".
- The fuel system is provided with a drain cock located on the decanting-filter, below the fuselage, next to the LH wing trailing edge.
- The fuel used in the Lycoming 0.235 H2D engine must have a minimum octane rating of 80/87.
- The fuel used in the Lycoming O-235-J2A engine must have a minimum octane rating of 100/130.

8.1 - Fuel system instruments and controls

a) - On instrument panel :

1 fuel content indicator, graduated in litres.
1 low fuel level warning light (facing pilot, LH side).
2 throttle controls (black knobs - to the left and in the centre of the instrument panel).

b) - On console :

1 carb. heating control
1 electrical pump switch
1 fuel supply cock control (OPEN = pushed : CLOSED = pulled).

8.2 - Fuel system inside fuselage (belly trap door and rear seat backrest removed)

- Check piping connections : locking, security of connectors, leaks.
- Check security of decanting filter and selector cock on the structure.
- Check piping under cabin floor (release the carpet attachments and lift the floor board by means of the hole provided for that purpose).
- Check operation of warning lights by actuating the fuel cock.

1st condition : Tank empty
2nd condition : Battery switch ON.

If the warning lights do not operate, one reason might be that :

- the bulb is US, through excess voltage or short-circuit. Fit a new bulb and check again for correct operation.
- if the "W/light" fuse is blown (RH of switch panel), there is a short-circuit in the fuel system electrical circuit. In this case, inspect thoroughly the corresponding installation.

8.3 - Fuel tank filler cap

- Check for sealing : the filler cap is located forward of the rear canopy section, on the LH side of the fuselage.
  To this end, remove the rubber seal located inside the cap and bend it between the fingers to assess its hardness and its porosity.
- Lightly lubricate the rubber seal with grease to facilitate the rotation of the filler cap (recommended grade : AIR 4214 A or any other general purpose grease).
- Grease AIR 4214 A (see lubrification chart) has the advantage of being resistant to hydrocarbons and is particularly recommended in this case.
- Check the security of the clips securing the connector between tank and filler neck.
- Ensure that the venting orifice (on the filler cap) is not obstructed.
- It is strongly recommended to fill up the fuel tank if the aircraft is to be left standing for a fairly long period of time (in the hangar or outside), as this will prevent condensation.

8.4 - Fuel system : engine side

- At this end, the fuel system is composed of pipes and components installed on the engine by the engine manufacturer, and of elements installed by the aircraft Constructor.

List of "Constructor" elements :

1 - Piping, from electrical pump to mechanical pump.
  - check connectors for leakage.

2 - Piping, from mechanical pump to carburetor.
  - check the piping for condition and leakage.
  - check locking of pressure-switch.

3 - Boost pressure pipe.
  This is a Rilsan covered copper pipe (dia. 2.75 x 4.76).
  - check routing (engine top RH side), security of clamps, passage through firewall.
  - check connection to Fuel Flow instrument (cabin side, front side of instrument panel).

8.5 - Air intake box

- Check security of under-carburetor air intake box, on carburetor : tightness and looking of securing screws.
- Check operation of carb. heater control flap.
- Check security of carb. heater control conduit.
- Check attachment and condition of heater flexible duct.
- Check attachment of air intake.
- Remove the air filter, clean with compressed air. Fit back in position.
- Check security of carb heater control, on the console (tight lock nut).

8.6 - Emergency electrical fuel pump

Located on the front LH side of the firewall (BENDIX type).

- Check piping connections and locking.
- Check electrical connection : no signs of wires chaffing against the structure (through vibrations).

8.7 - Decanting filter (le BOZEC, type A 6196)

- Check piping connections and locking (belly trap door removed).
  Inside the decanter is located a filtering element which it is recommended to clean after every 50 and 100 flying hours. To this end, unlock the lower section of the filter, remove the knurled plug and extract the filter.

  - clean with petrol and blow out with compressed air.
  - re-fit and check the sealing gasket.
  - tighten normally and re-lock the assembly.

SECTION 9

ELECTRICAL SYSTEM

9.1 - Description

a) - The electrical power is supplied by a 12 V DC, engine driven alternator. On HR 200 aircraft equipped with a Lycoming 0.235 series engine, the battery is located on the firewall.

b) - The master switch controls all electrical services, except the ignition system.

c) - The alternator switch controls the alternator. In the normal position, it must be ON. When set to OFF, the alternator supply is cut off and the power is supplied by the battery : any equipment not really needed must be switched OFF for the remaining part of the flight.
The ammeter indicates the intensity of the current supplied either by the alternator to the battery (charging), or by the battery to the electrical system (alternator OFF - Discharging).

d) - The circuit breakers protect the whole of the electrical system. The name of each circuit concerned is indicated under each circuit breaker.

- on the RH side of the instrument panel, the circuit breakers act as fuses.
Normal position : red knob pressed (to check the circuit, press the knob to release it. To switch ON, press the knob until latched).

- on the LH side of the instrument panel, the circuit breakers act as switches and fuses.

  - ON : green knob pressed.
  - OFF : press the red knob, to release the green one.

e) - Wing flaps control : the flaps are electrically actuated by means of a motor located inside the central fuselage section. They are controlled by means of a lever which allows them to be set at any required angle. The flap position can be checked by means of a position indicator located on the instrument panel, and by means of a warning light.

9.2 - General maintenance : instrument panel

a) - Test the whole of the cabin electrical system by checking, individually, each control of the instrument panel.

- Master switch + alternator
- Flaps control
- Emergency electrical pump
- Starter (outside workshop or hangar, on a surface free of any obstacles)
- Magneto switches (- - - - - -)
- Circuit breakers
- Warning lights
- All electrical instruments fitted as optional extras on the aircraft :

  . landing lights, navigation lights, rotating beacon, ...
  . instrument panel lighting.

9.3 - General maintenance : airframe electrical system

9.3.1 - Engine :

Check each connection : security of instrument terminals : nuts, lock nuts, star washers. Presence of rubber caps or insulating sleeves. Correct tightening of Nylon clips. When the electrical harnesses (and controls) are grouped and secured to the structural elements (engine bearer frame for example), test the security of the Nylon clips, i.e. :

a) - try to move the harnesses in their attachments to see if the existing play will lead to damaging vibrations.
b) - check wear marks on cables or conduits in contact with supporting means (the changing of colour of a PVC or coloured plastic sheath does not only indicate that wear might have occurred through normal rubbing, it might also be caused by excessive current through the circuit concerned). Indeed, it has been noted that through overheating, the colour of the sheaths alters slightly but sufficiently to be detected. However, it must be noted that on the P/P, there are certain zones where the local temperature is higher than normal (close to cylinders and exhaust system) : in such cases, the electrical lead sheaths can change colour without internal overheating.

9.3.2 - Structure : fuselage :

a) - Remove the rear seat and backrest, as well as the rear panel, to gain access to the central fuselage section.
b) - Check the exit and routing of conductors under a plastic conduit (these conduits are used by the Constructor to protect the leads against damage which might be caused by sharp edges under vibratory conditions).
c) - Check the security of isolated clips securing the cables along certain stiffening members.
d) - Check the security of terminal boards and terminals (LH and RH sides of fuselage).
e) - Clips secured by means of blind rivets : if loose, drill out to a larger diameter and fit a new rivet.

9.3.3 - Structure : wing :

a) - With fairings removed, check the passage of the cables, from fuselage to wing.
b) - Master switch ON, "Stall" circuit breaker ON, test the stall warning device by lifting it with a finger. At the same time, check the sound stall warning device. The latter is provided with a screw to adjust the sound level. This operation is carried out at the pilot's (or instructor's) request and varies in accordance with the hearing of the aircraft owner.

9.4 - Battery : standard equipment on HR 200 : SONNENSCHEIN Type 53211 - 12 V . 32 AH . 120 A.

9.4.1 - Battery charging :

a) - During this operation, the temperature must not exceed 40°C (105°F) or 50°C (125°F) in tropical conditions. If the battery overheats, stop the charging operation and allow it to cool off.
b) - The battery is fully charged when the charging voltage (2.6 to 2.7 V) per element and the specific weight of the acid at 1.28 (1.23 in tropical conditions), no longer alter.
c) - During use, keep the electrolyte level at the height specified. Only the water evaporates and, for this reason, top up only with distilled water. Check the acid level monthly or weekly during exceptionally hot periods.
d) - Filled batteries must be re-charged every 3 months if they are not used.
e) - Filling of new batteries : fill to 5 mm (3/16") above the separators or up to the edge of the fillers, with chemically pure sulphuric acid having a specific weight of 1.28 (32° Baumé) at 20°C (in tropical climates : 1.23 (27° Baumé) at 28°C).

9.4.2 - State of battery terminals :

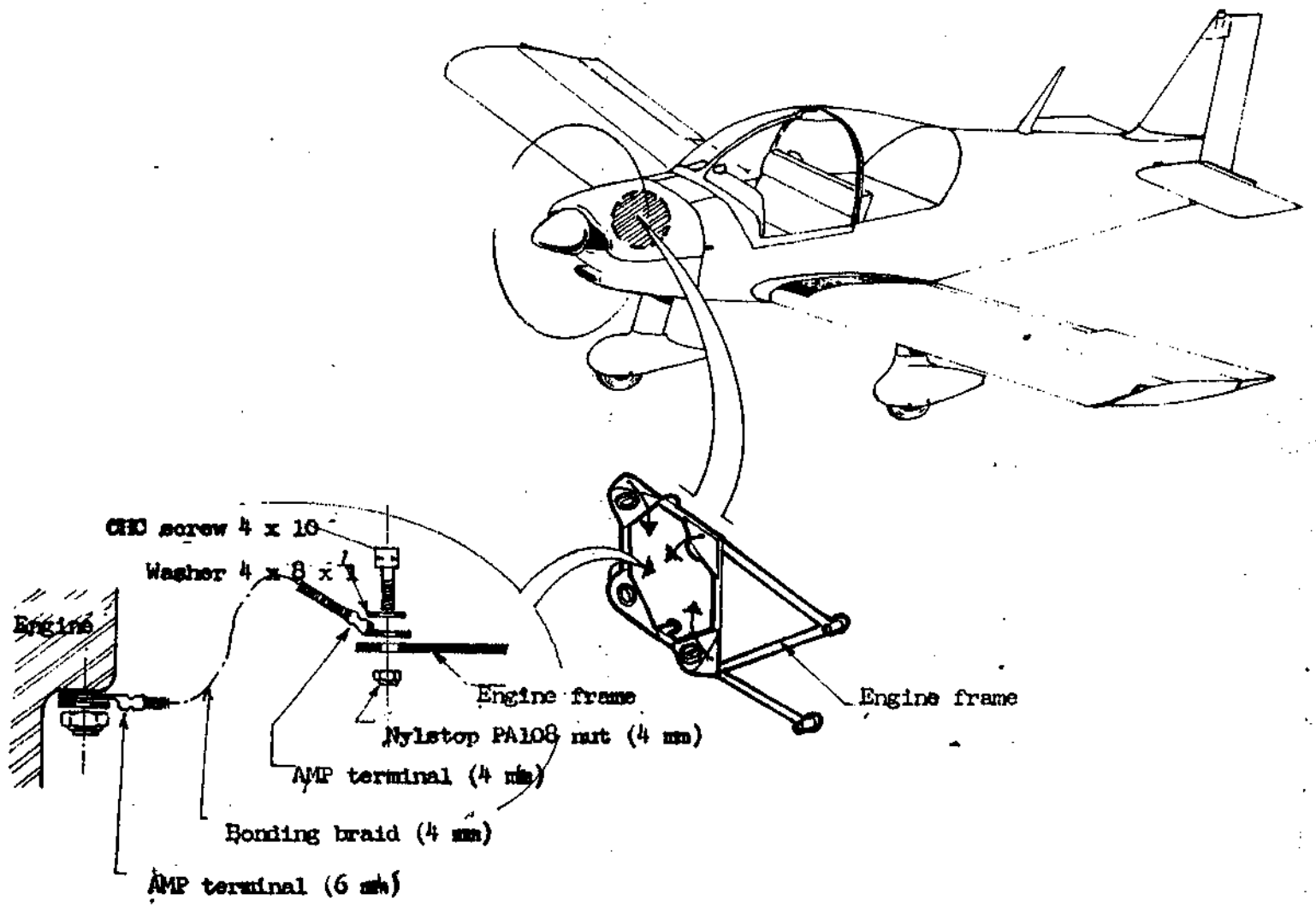
a) - Frequently check the security of the battery terminals (fairing cover removed).
b) - Clean the terminals with fine grade emery cloth. Lubricate with vaseline after connection and tightening (to prevent corrosion).
c) - Check the state of the battery tray (polyester) : cracks, crazing (for repairs, see Section 5, § 5.7.10).
d) - Check connection of battery vent pipe on battery tray and attachment to the RH side of the firewall.

9.5 - Voltage regulator (PRESTOLITE, VSF 7203) :

a) - This component requires no maintenance. When defective, it leads to a charging drop easily noticed on the ammeter. In case of defect, fit a new regulator (contact the Constructor). The Prestolite is a transistorized element and can be damaged by heat. For this reason, the Constructor has decided to install it inside the fuselage, behind the firewall, on the RH side (experience has proved that on aircraft where the regulator was installed on the engine side of the firewall, the large number of replaced regulators justified a modification of its location).

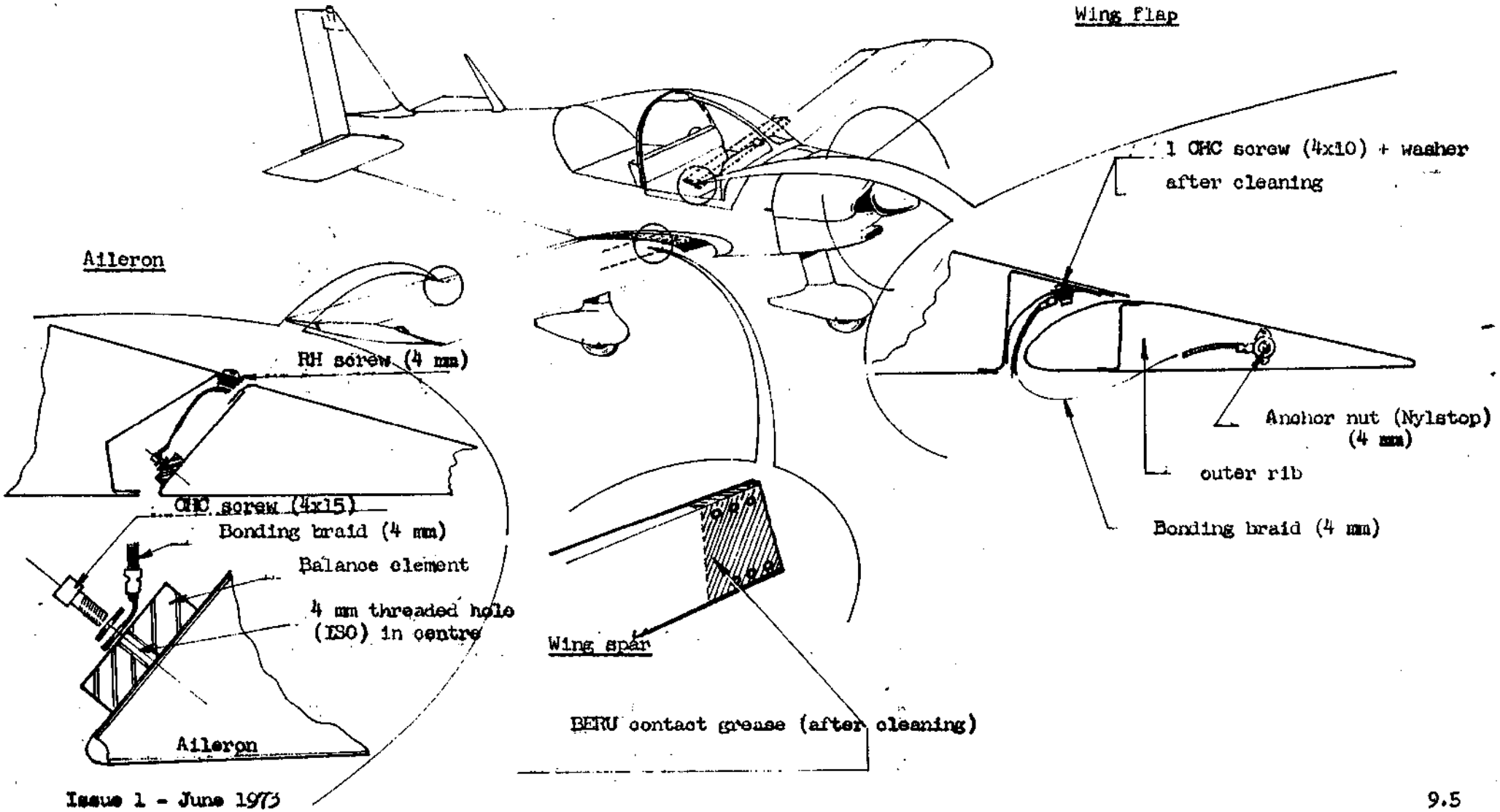
9.6.1 - Electrical bonding

Engine (P/P)



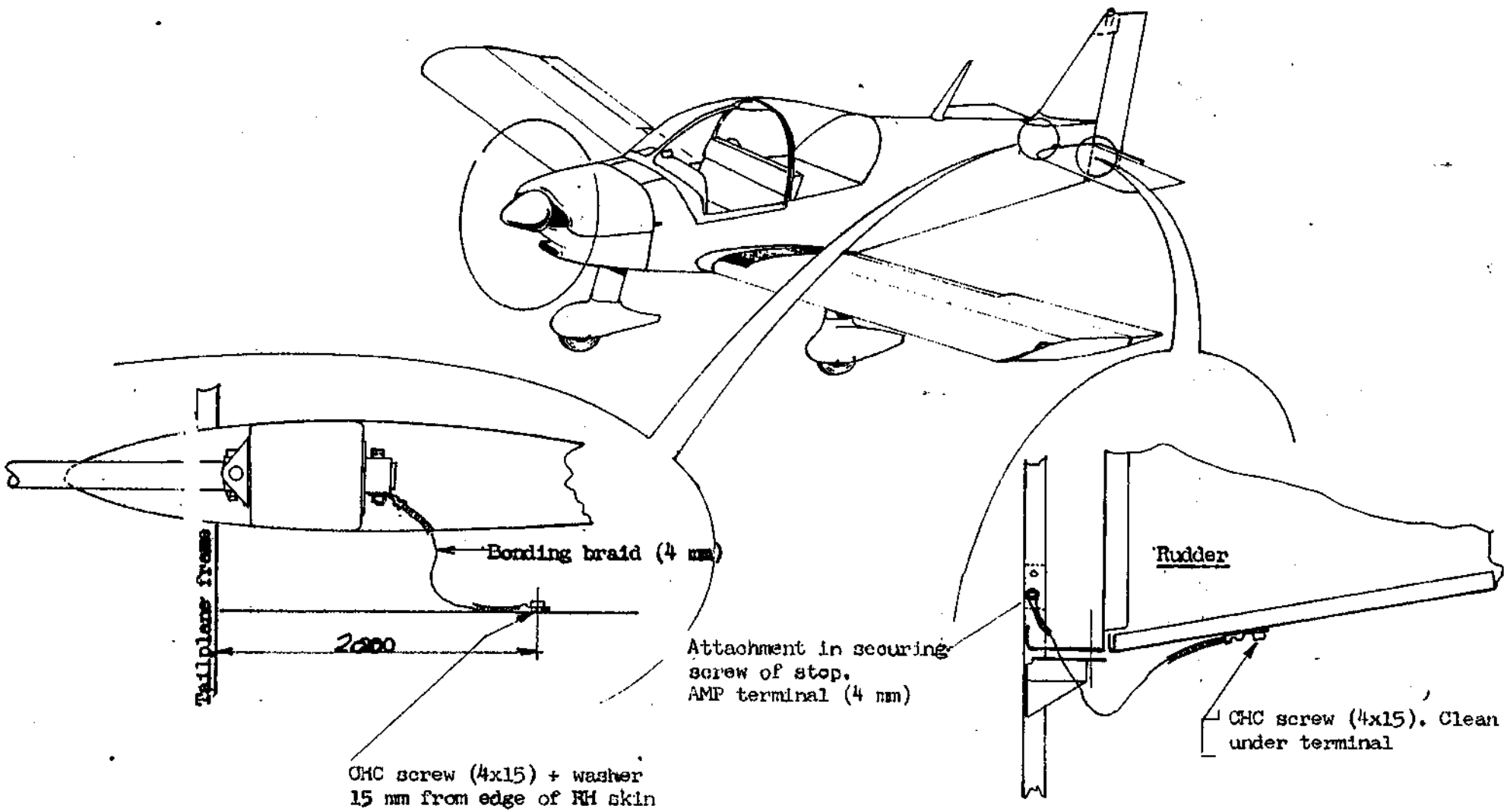
9.6.2 - Electrical bonding

Wing



9.6.3 - Electrical bonding

Tail unit



SECTION 10

VENTING - HEATING

10.1 - Description

On the HR 200 aircraft, cabin venting is provided by means of 2 fresh air vents, adjustable in direction and flow rate, of the WEMAC 2368 type. They are located on either side of the instrument panel.

Heating and air conditioning is also adjustable in direction and intensity, by means of positioning and flow rate controls located below the instrument panel, on the central console.

10.2 - Exhaust manifold muff

a) - Check attachment of muff on the exhaust manifold : welds, cracks.
b) - Check for leakage.

10.3 - Distribution ducts

a) - The supply of fresh air (or pressurized air for heating), from the front LH baffle to the RH exhaust manifold muff, is achieved by means of 50 mm (2") dia. "Aéroduct" flexible hoses.

b) - Check the attachment of these hoses :

1 - on the front LH baffle connector : "Serflex" type clamp.
2 - on the heating muff : "Serflex" type clamp.

c) - Check routing under the engine :

1 - sufficient clearance between hose and starter body (Lycoming 0.235 engines).
2 - correct attachment of clamp lug on engine.

d) - The hot air supply (muff outlet) uses the same type of flexible hoses.

10.4 - Main heating box

a) - This box, located to the right of the firewall (engine side) provides hot air to the front seats and to the demisting system. A control located on the central console actuates a selector flap in the heating box. When heating is not required, the hot air from the muff is exhausted via a light alloy pipe secured to the firewall.

b) - Check control attachment on selector flap : security of cable, locking, free movement.

10.5 - Heating/demisting box (inside fuselage)

a) - The hot air distributed by the main heating box is fed to a second box located opposite to the first one, on the cabin side. A control located on the central console allows :

1 - the hot air to be directed towards the passenger seats (over the legs) or,
2 - to be used for demisting (fed to front of canopy, forward of the instrument panel vizor).

b) - Check front seat/demisting ducts routing and connection. Eliminate all risks of vibrations and rubbing against panel instruments.

SECTION 11

INSTRUMENTS

11.1 - General description

a) - The instrument panel can accommodate sixteen 80 mm dia. instruments.

The 6 conventional flight instruments : A.S.I., rate of climb, altimeter, rev counter, compass, ball type indicator, can be installed in front of the pilot, or as requested by the Customer.
On the HR 200 aircraft, the instrument panel is mounted on silent-blocks.
The magnetic compass can be located in the centre of the instrument panel vizor.

b) - At the base of the instrument panel are located : the warning lights (facing the pilot), the fuses (passenger side) and the starter control (centre).

c) - The central console accommodates, from top to bottom :

1 - flap position indicator.
2 - flap control.
3 - magneto switches.
4 - carb. heater control.
5 - general heating control (left).
6 - front heating + demisting control (right).
7 - electrical fuel pump switch.
8 - alternator switch.
9 - mixture control.
10 - Battery switch.
11 - anti-tab control.
12 - fuel cock control.

d) - On the instrument panel, facing the pilot : 2 throttle controls and, at the bottom centre section, the handbrake.

e) - RH side of instrument panel : the combined Jaeger instrument, grouping : the ammeter, the oil pressure and temperature indicators, the fuel content gauge and the fuel pressure indicator.

f) - The cut out section, in the centre of the instrument panel, is provided to accommodate radio and radio-navigation equipment (optional).
This space can accommodate :

1 standard radio equipment
1 COM n°1
1 COM n°2
1 ADF (or radio-compass)
1 Transponder
1 DME

11.2 - Jaeger combined instrument

Failure of one of the indicators does not lead to a reject of the complete instrument. The instrument can be repaired and, during this period (repair carried out by Jaeger), the Constructor can supply the owner of the aircraft with a replacement, to avoid grounding of the aircraft.

11.3 - Instrument maintenance

In view of the various types of instruments proposed by the Constructor (and of those selected by the Customer when ordering the aircraft), it is impossible to lay down a precise set of maintenance instructions covering all instruments.

It is recommended to consult the maintenance notes issued by the manufacturers, which also include life potentials, as well as specific overhaul and adjustment instructions.

11.4 - Magnetic compass

a) - Ensure that this instrument contains enough fluid in its reservoir. If necessary, top up with toluene.
b) - Every time a new item of equipment is fitted on the aircraft, it will be necessary to revise the magnetic compass deviation card.

11.5 - Ball, or bank indicator

a) - Ensure that the glass container has not shifted from its position and does not vibrate inside the instrument. If it is impossible to carry out an efficient repair, the instrument will have to be changed. Check the state of the metal ball which might oxide and contaminate the fluid inside the tube.

11.6 - A.S.I. - Rate of climb indicator - Altimeter

a) - Check routing of the Rilsan piping inside the structure, and the connection of the A.S.I. tubing (red colour, dynamic pressure, inside wing - black colour, static pressure, inside fuselage).

b) - Check static vents orifices on the fuselage (one on each side), half-way between the wing and the tail-plane.

c) - Check the orifice of the Pitot tube under the LH wing. This device might be fitted with a de-icing heater (optional) : in this case, it will be necessary to check the efficiency of the heater (circuit-breaker on instrument panel switched ON). Every 100 flying hours, disconnect the instrument, static vent and Pitot head rubber pipes. Blow out with compressed air to eliminate any condensation water.

d) - Clean the glass panels of all instruments (with trichlorethylene).

11.7 - Engine rev. counter

a) - Check the rev. counter flexible drive, particularly where it passes through the firewall.

b) - Check connection to the instrument : locking of knurled nut and locking on engine (locking wire).

c) - Disconnect the drive every 100 hours and lubricate the flexible cable before inserting it back in the conduit. Tighten the knurled nut and lock.

11.8 - Markings

a) - Check the presence of all indicator plates. Replace if scratched, defaced or loose.

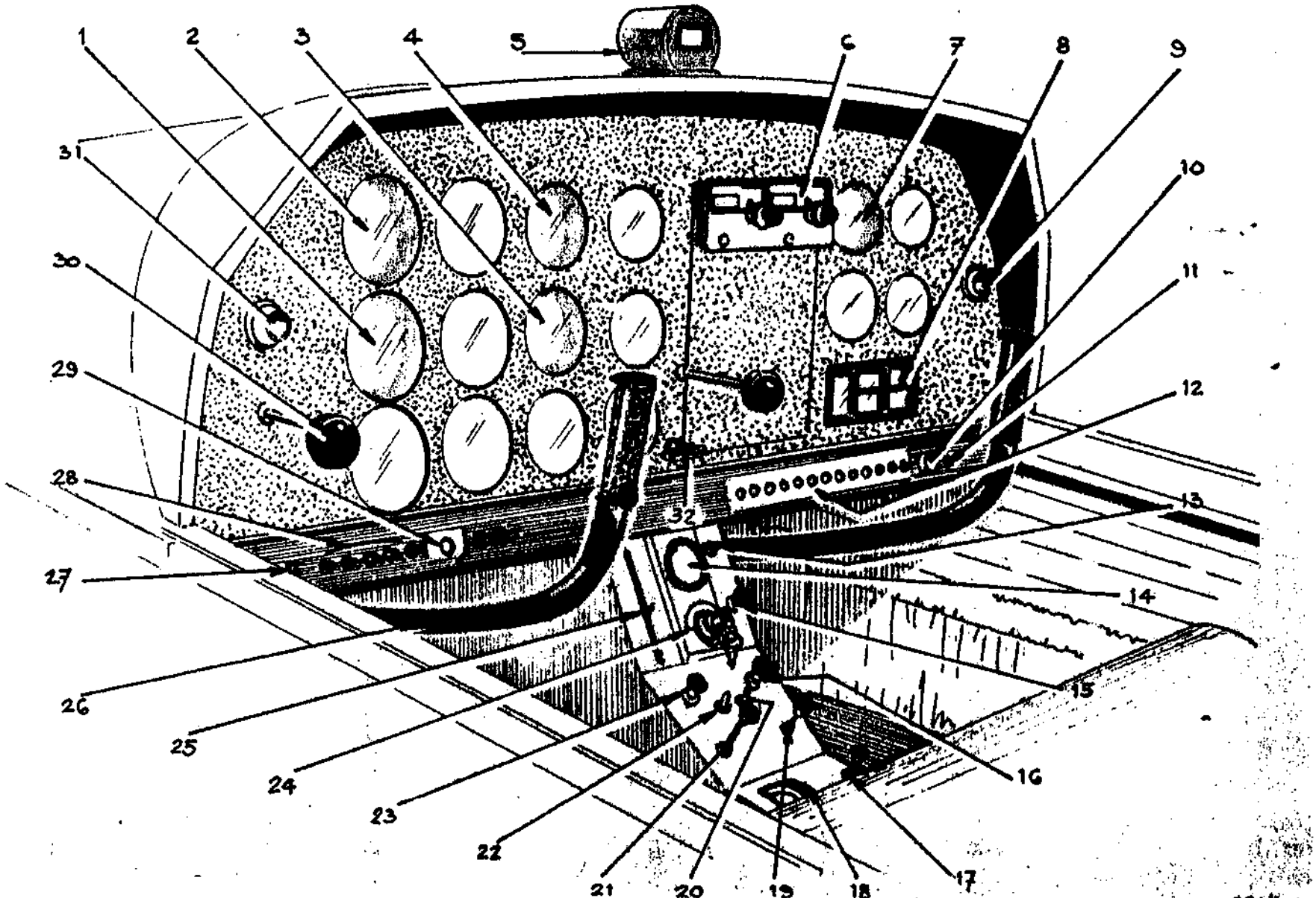
11.9 - Instrument markings

	A.S.I. kts	RPM Indicator RPM	Oil pressure Indicator (if fitted) PSI	Oil temperature Indicator °C	Fuel pressure Indicator (if fitted) PSI	Head cylinder temperature Indicator (if fitted) °C
HR 200/100	Red line at 160 Yellow arc from 131 to 160 Green arc from 60 to 131 White arc from 49 to 95	Red line at 2600 Green arc from 2000 to 2600	Red line at 25 Yellow arc from 25 to 60 Green arc from 60 to 90 Yellow arc from 90 to 100 Red line at 100	Red line at 118° Green arc from 40° to 118°	Red line at 0.5 Green arc from 0.5 to 8 Red line at 8	Green arc from 65° to 205° Yellow arc from 205° to 260° Red line at 260°
HR 200/120	" "	Red line at 2800 Red arc from 2025 to 2325 Green arc from 2325 to 2800	" "	" "	" "	" "

	A S I kts	R P M Indicator RPM	Oil pressure Indicator (if fitted) PSI	Oil Temperature Indicator °C	Fuel pressure Indicator (if fitted) PSI	Head cylinder temperature indicator (if fitted) °C
HR 200/120B with HO 14 propeller	. Red line at 160 . Yellow arc from 131 to 160 . Green arc from 60 to 131 . White arc from 52 to 95	. Red line at 2800 . Green arc from 2200 to 2800	Id. with HR 200/100	Id. with HR 200/100	Id. with HR 200/100	Id. with HR 200/100
HR 200/120B with MC 71. 47 prop.	" "	. Red line at 2800 . Red arc from 2025 to 2325 . Green arc from 2325 to 2800	" "	" "	" "	" "
HR 200/160	. Red line at 161 . Yellow arc from 131 to 161 . Green arc from 57 to 131 . White arc from 53 to 95	. Red line at 2700 . Green arc from 2000 to 2700	" "	" "	" "	" "

HR 200/100S : Ide HR 200/100 except. { ASI green arc from 54 to 131 kts
ASI White arc from 50 to 95 kts

INSTRUMENT PANEL (Example)



INSTRUMENT PANEL (Example)

1	Ball type indicator (ball and pointer on option)
2	A.S.I.
3	Rate of climb indicator
4	Altimeter
5	Compass (on vizor)
6	Radio equipment
7	Rev. counter
8	Jaeger instrument
9	WEMAC fresh air vent
10	Fuse (40 A)
11	Radio jack plug
12	Fuses
13	Flaps control
14	Flaps position indicator
15	Carb. heater control
16	Heating control
17	Fuel cock control
18	Tab control
19	Battery switch
20	Alternator switch
21	Mixture control
22	Electrical pump switch
23	Demisting control
24	Magneto switch
25	Anti-tab position indicator
26	Control stick
27	Radio jack plug
28	Warning lights
29	Starter switch
30	Throttle control
31	WEMAC fresh air vent
32	Handbrake